5.0 Description of Alternatives

Sections 5.0 and 6.0 of this ROD are applicable to the nine sites of concern identified in Section 4.0. This section describes the alternatives considered to address the risks associated with the nine sites of concern. Section 6.0 gives a summary of the comparison of the alternatives.

5.1 Remedial Action Objectives

Remedial Action Objectives (RAOs) are medium-specific goals established to protect human health and the environment. Medium-specific means soil, air, or groundwater. The RAOs include contaminants of concern (COCs), exposure routes and receptors, and an acceptable risk for each exposure route. The RAOs are used to help identify potential remedial action alternatives. The RAOs for OU 8-08 are protective of ecological receptors as well as human health. The media of concern for OU 8-08 is soil. Infiltration of contaminants to the groundwater is not a pathway of concern. The 100-year future residential scenario was used for the development of RAOs because controls are presently in place to protect current and future occupational workers and NRF is expected to remain an industrial site for at least the next 100 years. The rationale for the 100-year future residential scenario being the scenario of concern is given in Section 4.1.2.6. The RAOs for OU 8-08 are as follows:

For Human Health Protection

- Prevent external gamma radiation exposure from all radionuclides of concern that exceed a total exposure pathway excess cancer risk of 1 in 10,000 for the future 100-year residential receptor.

- Prevent ingestion of soil and food crops contaminated with radionuclides of concern that exceed a total pathway excess cancer risk of 1 in 10,000 for the future 100-year residential receptor.

- Prevent exposure to soil contaminated with lead that exceeds the EPA recommended screening level of 400 ppm for lead cleanup.

For Environmental Protection

- Prevent erosion or intrusion by resident plant or animal species in contaminated soils that could cause the release of contaminated soils.

- Prevent exposure to COCs that may cause adverse effects on resident species populations.

Specific remediation goals for the COCs were established based on the RAOs. The RAOs provide a target risk from which risk-based concentrations can be established. Generally, CERCLA risk management decisions are based on carcinogenic excess risk levels in the range of 1 chance in 10,000 to 1 chance in 1,000,000. Because of the conservative nature of the risk assessment assumptions used to calculate a corresponding soil concentration, a risk management decision was made to use the 1 in 10,000 excess carcinogenic risk as the target risk for calculating risk-based soil concentrations. Table 8 shows the COCs, the exposure routes of concern, and the soil concentration for each constituent corresponding to a 1 in 10,000 excess carcinogenic cancer risk (except for lead which reflects a corresponding soil concentration that is an EPA recommended screening level for lead cleanup) for the future 100-year residential scenario. Other exposure routes are available for the COCs shown on Table 8, but only those routes with an excess risk greater than 1 in 1,000,000 (1E-06) are

shown since a risk less than 1E-06 would not significantly contribute to the overall risk associated with the COC.

Table 8 also shows the maximum concentration of each COC detected at each site of concern during characterization sampling performed in 1991 and 1992 or NRF Comprehensive RI/FS sampling performed in 1996. The bold numbers on Table 8 represent those contaminants present above a risk-based concentration. Although NRF-11 (S1W Tile Drainfield portion), NRF-17, and NRF-80 do not show the presence of contaminants above risk-based concentrations, indirect evidence suggests that contaminants are present above risk-based concentrations.

The three primary contaminants of concern are lead, cesium-137, and strontium-90, which were the only contaminants detected above risk-based concentrations. Remediating the soil to specific lead, cesium-137, and strontium-90 soil concentrations would reduce the risk associated with those constituents and in all likelihood would reduce the other contaminants' risk values. For example, the maximum detected concentrations of americium-241, nickel-63, plutonium-238, and plutonium-244 all occurred in areas where cesium-137 was above cleanup levels.

Remediation goals, which generally refer to a specific contaminant concentration, are established to meet the RAOs and are based on lead, cesium-137, and strontium-90 concentrations. The remediation goals for OU 8-08 are 16.7 pCi/g of cesium-137, 45.6 pCi/g of strontium-90, and 400 ppm lead. The remediation goals are based on human health risks and are also protective to ecological receptors. As stated in Section 4.2, the ecological risk assessment concluded no additional action above those actions taken for protection of human health was necessary due to estimated risks to ecological receptors.

5.2 Summary of Alternatives

The NRF Comprehensive Feasibility Study identified four remedial action alternatives to be considered for detailed analysis. These alternatives, with the exception of the No Action alternative, meet the RAOs, provide overall protection of human health and the environment, meet ARARs, and are cost effective. The four remedial action alternatives are as follows:

- Alternative 1: No Action
- Alternative 2: Limited Action
- Alternative 3: Limited Excavation, Disposal, and Containment
- Alternative 4: Complete Excavation and Off-site Disposal

5.2.1 Alternative 1: No Action

The National Contingency Plan (NCP) requires consideration of a no action alternative to serve as a baseline for evaluation of other remedial alternatives. No land-use restrictions, controls, or active remedial measures are implemented at the site under this alternative beyond the projected Federal government 100-year institutional control period. Thus, contamination is attenuated only through radioactive decay processes. Current monitoring and radiological controls would continue during the institutional control period, which is the time frame that NRF remains an industrial site.

Table 8. Risk-based Soil Concentrations and Maximum Concentrations (pCi/g or ppm) of COCs Detected at Sites of Concern

Risk-based Soil Concentrations[a]	Lead[b]	Am-241	Cs-137	Np-237	Ni-63	Pu-238	Pu-244	Sr-90	U-235
Direct Contact	400[c]	NA	NA	NA	NA	NA	NA	NA	NA
External Exposure	NA	895	16.7	NA	NA	NA	3.3	NA	13.2
Ingestion of Soil	NA	283	24,860	NA	NA	590	NA	15,418	NA
Food Crop Ingestion	NA	301	164	19.8	15,846	1,153	NA	45.6	NA
Site of Concern									
NRF-11 S1W Tile Drainfield	11.1	ND	0.3	ND	9.96	ND	ND	ND	ND
L-Shaped Sump	13.0	0.42	**45.98**	ND	ND	ND	0.09	ND	ND
NRF-12A	13.0	0.60	**7,323**	ND	329.06	0.60	0.24	35.35	ND
NRF-12B	**1,140**	0.15	**1,600**	ND	171.40	0.15	ND	37.30	ND
NRF-14	31.5	5.9	**2,040**	0.79	730	5.9	ND	**83**	ND
NRF-17[d]	89	ND	1.1	ND	ND	ND	ND	ND	ND
NRF-19	18.4	20	**1,390**	ND	730	20	ND	**750**	ND
NRF-21A	150	ND	**229**	ND	7.74	ND	ND	2.02	ND
NRF-21B	75	ND	**43.9**	ND	4.59	ND	ND	ND	0.17
NRF-80	14	ND	ND	ND	5.48	ND	ND	ND	ND

Bold indicates concentration of contaminant detected above a risk-based concentration.
ND – Not Detected
NA – Not Applicable

(a) Concentrations correspond to a 1×10^{-4} carcinogenic risk.
(b) Lead results derived from total metals analysis.
(c) EPA recommended screening level for lead cleanup.
(d) Sample results were from soil adjacent to the retention basins and not from suspected contamination below the basins.

The no action alternative would be easily implemented without any additional costs. However, the risk assessment performed for the OU 8-08 sites of concern indicates the presence of unacceptable risks to human health and the environment and therefore, the no action alternative is ineffective and does not meet the RAOs.

5.2.2 Alternative 2: Limited Action

Alternative 2 consists of the following institutional controls to protect human health and the environment against potential risks associated with OU 8-08 sites of concern:

- Long-term monitoring
- Fencing and/or other barriers
- Land use restrictions
- Existing cover inspection and maintenance
- Erosion control

Long-term monitoring would be performed at all sites. Monitoring would include continued sampling of soils near the sites of concern and groundwater sampling. Specific monitoring parameters would be established during the remedial design phase, but would likely include radiological groundwater sampling from present monitoring wells. Such monitoring activities would be performed concurrently with any other ongoing monitoring programs at NRF and the INEEL. The monitoring would continue through the institutional control period, which is the time frame that NRF remains an industrial site.

Access to the INEEL is currently restricted for purposes of security and public safety. Since the location of all the OU 8-08 sites are within the boundaries of the INEEL, site-wide access restrictions would limit accessibility. In addition, the existing double security fence surrounding NRF encloses all of NRF-17, 21B, and 80, and portions of NRF-11 and 12A. The existing security fence would be maintained as necessary during the control period. Installation of additional fences or relocation of existing fences may also be necessary. Other access control measures may include (but are not limited to) warning signs, property border signs, land use restrictions, and establishing training requirements for persons allowed access. A description of the areas where access would be restricted, the specific controls (e.g., fences, signs) that would be used to ensure that access would be restricted, the types of activities that would be prohibited in certain areas (e.g., excavation), and the anticipated duration of such controls, would be determined during the remedial design phase and would be incorporated into the Bettis Atomic Power Laboratory Site Development Plan (SDP). This information would be submitted to the EPA and IDHW once it has been placed in the SDP. As appropriate, NRF would also provide the Bureau of Land Management or other Federal agencies the detailed description of the controls identified above.

Maintenance of surface integrity, including repairing effects of subsidence and erosion, would be performed as necessary to prevent exposure of subsurface contaminants. Maintenance crews would use the same type of native soil presently at NRF. Erosion control would be maintained by grading surface areas to provide drainage and runoff control, and revegetation may prevent erosion of existing cover materials.

The limited action alternative is considered to be easily implemented for both the short- and long-term, since the specified actions are essentially a continuation of the existing management practices conducted at the OU 8-08 sites of concern. The costs associated with this alternative are primarily due to environmental monitoring activities. Soil cover maintenance, fence maintenance, and erosion control would be performed only on an as-needed basis.

This alternative is generally considered to be effective for the protection of human health and the environment. However, after the institutional control period of the INEEL is discontinued, risks to human health and the environment would be dependent on access restrictions placed around the sites of concern. Assuming access restrictions are maintained even after the end of the institutional control period and the ability to enforce the access restrictions exists, Alternative 2 is considered effective for protection of human health if there is no degradation of the existing cover material. Alternative 2 may not be as effective to the protection of ecological receptors, since small animals may burrow into the soil or plants may establish residence in the cover material. The approximated time to implement this alternative would be one year.

5.2.3 Alternative 3: Limited Excavation, Disposal, and Containment

Alternative 3 consists of the following actions to isolate the contaminated soil at OU 8-08 sites of concern:

- Excavation using standard techniques
- Verification sampling
- Transportation
- Contamination control
- On-site consolidation
- Containment with engineered earthen cover
- Site restoration
- Institutional controls
  - Short-term monitoring
  - Long-term monitoring
  - Fencing and/or other barriers
  - Land use restrictions
  - Cover inspection and maintenance
  - Erosion control

This alternative removes soil and debris from six sites and consolidates the soil at NRF-14 (S1W Leaching Beds). An estimated 133,000 cubic feet of soil would be excavated of which an estimated 58,000 cubic feet would be contaminated above remediation goals and placed in NRF-14. Approximately 3,130 linear feet of underground piping would be removed. An engineered cover would be placed over NRF-14 and NRF-12B, which are adjacent to each other. Another cover would be placed over NRF-19. This alternative requires excavating contaminated soil, pipes, and concrete structures from the following sites: NRF-11, 12A, 17, 21A, 21B, and 80. Conventional excavation equipment has been demonstrated to be effective in retrieving radioactive soil and debris in other INEEL remedial responses. After excavation, these sites would be filled with clean soil. In addition, the pipes leading to NRF-14 and 19 would be excavated. The pipe and concrete structures, which would have been removed during decontamination and dispositioning work regardless of remedial actions, would be managed and disposed of under current NRF radioactive waste management policies. Presently, this involves disposal at the Radioactive Waste Management Complex (RWMC) for radiologically contaminated debris or disposal per the INEEL Site Treatment Plan for mixed radiological and hazardous debris. NRF-12B (S1W Leaching Pit), NRF-14 (S1W Leaching Beds), and NRF-19 (A1W Leaching Bed) represent the sites with the greatest volumes and concentrations of contaminated soil. The soil at NRF-12B, 14, and 19 would not be removed.

A single area of contamination (AOC) will be defined to include the areal extent of contiguous contamination which will encompass both the excavation and consolidation sites. The specific boundaries of the AOC would be identified and refined in subsequent documents such as the Remedial Design/Remedial Action Scope of Work and the Remedial Action Work Plan. Under this alternative, contaminated soils are not expected to be removed from the AOC. Movement

and stock-piling of contaminated soils within the AOC for purposes of consolidation during remedy construction is not intended to trigger Idaho Hazardous Waste Management Act/Resource Conservation and Recovery Act land disposal restrictions. However, in the unlikely event that the volume of contaminated soils exceeds the capacity of the leaching beds, contingency actions could include disposal of contaminated soils outside of the AOC (i.e., probably away from the NRF). In such a case, the soils would be subject to the same waste management requirements that pertain to the contaminated debris leaving the AOC.

Real time gamma surveys could be used to delineate the extent of contamination to be removed as the excavation proceeded. Sodium iodide or germanium detectors could be calibrated to detect radiological contamination present at concentrations above remediation goals. Cesium-137, which is a gamma emitter, is the primary COC at each site. As deemed necessary in the remedial design phase, laboratory analysis of an agreed upon number of representative grab samples would be required to verify the real-time assessment. Real-time surveys can reduce the volume of clean soil removed and mixed with contaminated soil.

Current radiological controls practices could be used to reduce radiation exposure to the operator. Radiological controls could consist of limiting the amount of time an operator can work in the area, using containment structures around the contaminated material to prevent the spread of contaminants, ensuring containment structures around the contaminated material have a negative pressure to prevent airborne release of contaminants, wearing personnel protective equipment, and using distance and shielding to reduce radiation exposure.

Debris would be sampled during excavation for characterization purposes to ensure it is not RCRA hazardous. No RCRA hazardous debris is expected at any of the sites of concern. If sampling shows the debris to be RCRA hazardous and radiologically contaminated, then the debris will be disposed of as mixed waste per the INEEL Site Treatment Plan. The debris would be packaged according to the Site Treatment Plan requirements.

During excavation, dump trucks would most likely be positioned near the excavation site such that backhoes can place the contaminated soil directly into the dump truck. Possible dust suppression techniques used during excavation include: keeping the soil wetted during excavation activities, performing excavation in tented enclosures, halting excavation work during windy conditions, and keeping man-made covers over contaminated soils. The dump truck may contain tarps to prevent the release of soil in transit. The dump truck will then transport the soil to the S1W Leaching Beds (NRF-14) for on-site consolidation. The leaching beds contain dirt ramps to allow the dump truck to drive to the bottom of the leaching beds and empty the soil. Other means of transporting the soil, such as directly with a backhoe or in boxed containers, would be considered during the remedial design phase of the action. The estimated contaminated soil volume from all the proposed excavation areas would fit into the present leaching beds. All actions will require radiological controls as discussed above. Contingency actions would include off-site (away from NRF) disposal of soil that exceeds the capacity of the leaching beds or continued consolidation at the beds above surface level, although these are unlikely to be necessary.

Verification sampling, consisting of radiation surveys and soil sampling and analysis, would be performed to confirm that all contamination exceeding remediation goals was removed from the site of concern. Following the removal of the contaminated soil from the sites, contouring to conditions of the surrounding landscape and filling excavated areas with clean materials would restore each site. Backfilled areas would be compacted to prevent future subsidence. Sites would be revegetated as appropriate.

The engineered cover could consist of geologic materials including native soil, gravel, basalt cobbles, and rip-rap. Variations from this conceptual design are possible based on layer

thickness, layer material, layer order, location of a potential biobarrier in the cap profile, and other considerations. The conceptual design would be developed during the remedial design and modified as needed to meet defined functional and operational requirements, with the concurrence of regulatory agencies. The engineered barrier will be designed for use in arid climates, but may include designs limiting infiltration.

Specific performance goals (as given in 10 CFR 61, Licensing Requirements for Land Disposal of Radioactive Waste) are established for the cover and include:

- Installation of covers that are designed to discourage any individual from inadvertently intruding into the contaminated soil, or from contacting the contaminated soil at any time after active institutional controls over the sites are removed, up to the design life of the covers.
- Application of maintenance and surface monitoring programs for the containment systems capable of providing early warning of releases of radionuclides from the sites, before they leave the site boundary.
- Institution of restrictions limiting land use to industrial applications for at least 100 years.
- Implementation of surface water controls to direct surface water away from the contaminated soil.
- Elimination, to the extent practicable, of the need for ongoing active maintenance of the sites following closure so that only surveillance, monitoring, or minor custodial care are required.
- Placement of adequate cover to inhibit erosion by natural processes for the specified design lives of the cap.
- Incorporation of features to inhibit biotic intrusion into the contaminated soil areas.

Institutional controls would be implemented after the construction of the covers. Long-term monitoring, fencing and/or other barriers, land use restrictions, cover inspection and maintenance, and erosion control as explained for Alternative 2, Limited Action, would be applicable. A description of the areas where access would be restricted, the specific controls (e.g., fences, signs) that would be used to ensure that access would be restricted, the types of activities that would be prohibited in certain areas (e.g., excavation), and the anticipated duration of such controls, would be determined during the remedial design phase and would be incorporated into the SDP. This information would be submitted to the EPA and IDHW once it has been placed in the SDP. As appropriate, NRF would also provide the Bureau of Land Management or other Federal agencies the detailed description of the controls identified above.

Radiation surveys would be required at the covered sites. Additional surveys across and around the sites would be performed to detect radionuclides potentially mobilized by burrowing animals, erosion, or other natural processes. Cover integrity monitoring would be performed across and around the cover sites to assess maintenance requirements due to erosion, cracking, or other observable deterioration of the cover.

Maintenance to the protective cover would be performed based on the results of routine cover inspections. The protective cover would likely be inspected monthly during the first 12 months because potential problems (such as settling or subsidence) are most likely to occur within this period. After the initial 12 month period, cover inspection may be performed annually. Maintenance requirements may include periodic removal of undesirable vegetation and burrowing animals and filling animal burrows. In addition, unacceptable erosion or subsidence would require repair of the affected area. Operations and maintenance goals will be defined during remedial design.

The short-term effectiveness of this alternative for protecting human health is judged to be moderate. Equipment operators and site personnel could receive minor radiological exposures

during removal activities, however, these exposures could readily be controlled using standard radiation control measures. Short-term protection of the environment is expected to be high because adequate contamination control measures are specified. Toxicity and volume of contaminants would not be reduced by this alternative.

This alternative is considered to be highly effective in preventing long-term exposure at the covered areas. The shielding effects of the various layers of natural media would reduce surface radiation exposure. The covers are designed for long-term isolation with minimal maintenance requirements. The engineered cover for this alternative would be effective in preventing biointrusion and add a high level of inadvertent human or animal intruder protection, by both the mass and impenetrability of material overlying contaminated soils.

Installation costs of this engineered cover are financially feasible. Construction materials are readily available on-site. Long-term inspection and maintenance requirements are considered minimal. Long-term monitoring requirements, including radiation surveys, would be easily implemented during the institutional control period. The approximate time to implement this alternative would be three years.

5.2.4 Alternative 4: Complete Excavation and Off-site Disposal

Alternative 4 consists of the following actions to isolate the contaminated soil at OU 8-08 sites of concern:

- Excavation using standard techniques
- Verification sampling
- Transportation
- Contamination control
- Off-site (away from NRF) disposal
- Site restoration

This alternative would require excavating contaminated soil, pipes, and concrete structures from all the OU 8-08 sites of concern and disposing of the soil and debris to an off-site (away from NRF) location. An estimated 1,171,000 cubic feet of soil would be excavated of which an estimated 447,000 cubic feet would be contaminated above remediation goals requiring off-site disposal. Approximately 3,130 linear feet of pipe would be removed. The procedures and equipment used for excavating, surveying, and sampling soil would be the same as Alternative 3. Since NRF-12B, 14, and 19 would also be excavated, additional excavating, surveying, and sampling of the soil would be required. In addition, the soil would be characterized as described for the debris in the Alternative 3 discussion since the soil would be removed from the area of contamination (AOC). Filling excavated sites with clean soil, disposing of contaminated debris, and using currently practiced radiological controls would be the same as Alternative 3.

Similar to Alternative 3, dump trucks could be used to transport the contaminated soil. The dump truck would transport the soil to a transfer station or the disposal location. Actual shipping methods and packaging requirements would be determined during remedial design. Packaging may include placement of the soil in 4 foot wide by 4 foot deep by 8 foot long box prior to transportation away from NRF or the soil may be directly transported to the disposal facility by truck.

Disposal may occur at a proposed INEEL soil repository. The status of this facility is uncertain. The facility is currently projected to be south of the Idaho Nuclear Technology and Engineering Center (INTEC) (formerly the Idaho Chemical Processing Plant (ICPP)), which is only a few miles from NRF. The projected facility has not yet received funding or approval from DOE or

regulatory agencies. A decision on the proposed disposal facility is expected in 1999. This alternative would require a secondary plan if the facility were not approved or available for remedial actions occurring at NRF. Secondary disposal options include the RWMC, Test Reactor Area (TRA) Warm Waste Pond, or an off-INEEL disposal facility such as Envirocare in Utah.

The short-term effectiveness of this alternative for protecting human health is judged to be moderate. Complete excavation, which includes excavating all sites of concern rather than the limited excavation of Alternative 3 that does not excavate all sites of concern, would require the operators to be on-site longer and potentially exposed to contaminants for a longer duration. Equipment operators and site personnel could receive minor radiological exposures during removal activities, however, these exposures could readily be controlled using standard radiation control measures. Short-term protection of the environment is expected to be high because adequate contamination control measures would be specified. Long-term protection of human health and the environment is judged to be highly effective because contaminated soil would no longer exist at any NRF site. Toxicity and volume of contaminants would not be reduced by this alternative.

Short-term technical implementability of this alternative is considered moderate if the proposed INEEL soil repository is approved and available for NRF soil generated from remedial actions. Proposed excavation equipment is currently available. Characterization, packaging, and transportation of the contaminated material can be performed using currently available technology. Long-term implementability is considered high, since the contamination is removed. Long-term inspection and maintenance are considered minimal. Long-term environmental monitoring other than what is currently performed would not be required because the contaminant source would be removed.

The short-term costs of this alternative would be high. Significant costs would be incurred for safety analysis, satisfying ARARs, and operational and capital costs. The primary capital costs associated with this alternative would be disposal facility fees and transportation costs. Compared to other disposal options, the potential INEEL soil repository disposal costs are considered moderate. Operations and maintenance costs would be high during the excavation and disposal period primarily because of the radiological considerations. Long-term monitoring costs would be low assuming all contamination could be removed from the sites of concern. The approximate time to implement this alternative would be five years.

6.0 Summary of Comparative Analysis of Alternatives

The alternatives discussed above were evaluated using the nine criteria as specified by CERCLA:

- **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- **Compliance with ARARs** addresses whether a remedy will meet all of the ARARs under federal and state environmental laws and/or justifies a waiver.

- **Long-term Effectiveness and Permanence** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

- **Short-term Effectiveness** addresses any adverse impacts on human health and the environment that may be posed during the construction and implementation period and the period of time needed to achieve cleanup goals.

- **Reduction of Toxicity, Mobility, or Volume through Treatment** addresses the degree to which a remedy employs recycling or treatment that reduces the toxicity, mobility, or volume of the contaminants of concern, including how treatment is used to address the principal threats posed by the site.

- **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- **Cost** includes estimated capital and operation and maintenance costs, expressed as net present-worth costs.

- **State Acceptance** reflects aspects of the preferred alternative and other alternatives that the state favors or objects to and any specific comments regarding state ARARs or the proposed use of waivers.

- **Community Acceptance** summarizes the publics general response to the alternatives described in the proposed plan and in the RI/FS, based on public comments received.

Each of the four alternatives were evaluated against the nine evaluation criteria identified above. The criteria are subdivided into three categories: (1) threshold criteria that mandate overall protection of human health and the environment and compliance with ARARs; (2) primary balancing criteria that include long- and short-term effectiveness, implementability, reduction in toxicity, mobility, or volume through treatment, and cost; and (3) modifying criteria that measure the acceptability of alternatives to state agencies and the community. The selected remedial action alternative must meet the threshold criteria. The balancing criteria are used in refining the selection of the candidate alternatives for the sites. The modifying criteria are used in the final evaluation of remedial alternatives and factors include the elements of the alternatives that are supported, not supported, or have strong opposition. The following sections summarize the detailed analysis of the four alternatives against the nine evaluation criteria.

6.1 Overall Protection of Human Health and the Environment

Alternative 1 (No Action) does not meet the RAOs. There would be no reduction in long-term risk to the public. The risk assessment performed in the NRF Comprehensive RI/FS shows that the no action alternative would not meet the criteria for overall protectiveness because some of the calculated risk values represent an increased cancer risk greater than the NCP upper limit of 1 in 10,000. With this alternative, the potential exists for direct exposure to humans. No surface water controls would exist to prevent erosion and exposure of contaminants to the environment.

Alternative 2 (Limited Action) initially meets the human health protection RAOs by providing restrictions on access and land use to prevent direct contact with the soil. This alternative would also provide early detection of potential contaminant migration although this is not expected. Alternative 2 would also restrict access to the areas by larger animals such as deer and antelope, but may not restrict contact with the soil by smaller animals that could easily navigate through the established barriers. This alternative would also not prevent erosion or intrusion by plant species unless additional care is taken to repair erosion and prevent plants from establishing residence at the sites. No short-term effects would be created if Alternative 2 is implemented, because there would be no disturbance of the soil to affect the workers or the community. Long-term effectiveness would depend on the enforcement of land use restrictions, the effectiveness of posted signs, and continued maintenance operations to repair existing covers.

Alternative 3 (Limited Excavation, Disposal, and Containment) would meet all RAOs and provides a barrier (cover) against direct contact of contaminants by human and ecological receptors. This alternative also restricts access to the areas by fencing or other barriers and places land use restrictions while providing early detection of potential contaminant migration although this is not expected. The short-term effects would be limited to disturbance of the soil and potential effects to the construction workers but not the community. Proper engineering controls along with personal protective equipment will reduce exposure hazards to the workers. Long-term effectiveness will depend on land use restrictions and adherence to posted signs. Long-term effectiveness would also depend on the continued maintenance of the cover. In addition, long-term monitoring would provide meaningful data to measure this alternative's overall effectiveness.

Alternative 4 (Complete Excavation and Off-site Disposal) would meet all RAOs. The off-site (away from NRF) disposal area would provide a barrier (cover) against direct contact of contaminants by human and ecological receptors. The short-term effects would be limited to disturbance of the soil and potential effects to the construction workers but not the community. Proper engineering controls along with personal protective equipment will reduce exposure hazards to the workers. There will be no long-term consequences at the excavation sites because all contaminants would be removed, but long-term effectiveness at the off-site disposal area will depend on the enforcement of institutional controls and continued maintenance of the cover at the off-site disposal area.

Alternatives 3 and 4 equally satisfy the criteria of overall protection of human health and the environment. These alternatives cover the contaminants preventing direct contact with the soil, restrict future land use, minimize infiltration, and provide an early indication of contaminant migration although migration is not expected. Although Alternative 2 meets the general criteria of overall protection of human health, it does not prevent direct contact of contaminated soil by ecological receptors. It also does not prevent erosion or intrusion by plant species unless additional care is given to repair erosion conditions and prevent plants from establishing residence at the sites.

6.2 Compliance with ARARs

Alternative 1 (No Action) would not meet DOE orders regarding protection of current or future receptors. Because Alternative 1 and Alternative 2 (Limited Action) do not provide containment of contaminants, they may not meet applicable rules regarding fugitive dust or control of air pollution, although there is no evidence that specific regulatory levels would be violated. No specific action would be taken to control fugitive dust or air pollution, which is possible for surface soil contaminated areas; however, sampling and institutional controls for Alternative 2 would monitor the media of concern and prevent access to the sites of concern. Alternatives 3 and 4 would meet all ARARS and To-Be-Considered criteria provided proper engineering controls for dust suppression and emissions control are followed during excavation. If RCRA characteristic waste is encountered, which is not expected, those ARARs associated with RCRA requirements would be met.

6.3 Long-term Effectiveness and Permanence

The No Action alternative does not prevent future occupants from coming into direct contact with the contaminated soil or prevent exposure to contaminated soil through erosion by wind or water. This alternative does not maintain long-term effectiveness or permanence.

Limited Action (Alternative 2) would prevent future occupants from coming into direct contact with contaminated soils by establishing fencing or other barriers and by land use restrictions, but does not prevent exposure to contaminated soil through erosion by wind or precipitation. The long-term effectiveness depends on the ability to enforce the land use restrictions and maintain existing covers. Long-term monitoring of groundwater and soil would provide early warning of potential contaminant migration, although this is not expected.

Limited Excavation, Disposal, and Containment (Alternative 3) consolidates most of the soil at NRF-14. An engineered earthen cover would be placed over NRF-14 and the adjacent area, NRF-12B. Another cover would be placed over NRF-19. This alternative would prevent the dispersion of contaminants through erosion by wind or precipitation and direct exposure by contact, and would limit infiltration from precipitation. The long-term effectiveness of this alternative depends on the durability of the designed cover and effectiveness of the engineered layers. Long-term effectiveness would also be achieved by using institutional controls, maintenance, and monitoring. Institutional controls (land use restrictions and fencing or other barriers) would be used to restrict residential development of this land, which could breach the covers and expose the contaminated materials. In addition, long-term maintenance, including inspections and cover repairs, would prevent a breach of the cover. Long-term monitoring of the groundwater and soil would be initiated to provide early warning of contaminant migration, although this is not expected.

Complete Excavation and Off-site Disposal (Alternative 4) removes contaminated soil from NRF and transports the soil to a proposed INEEL soil repository or similar licensed facility. Since the contaminants are removed from NRF, long-term effectiveness is achieved at the removal areas. The residual risk remaining at NRF would result from soil containing contaminants below the cleanup levels, which were established based on risk-based concentrations. Long-term effectiveness at the off-site (away from NRF) disposal area would depend on the institutional controls, maintenance, and monitoring performed at the off-site disposal area. Alternative 4 provides the best long-term effectiveness and permanence of all the alternatives because it removes the contaminant source.

6.4 Short-term Effectiveness

Alternative 1 does not perform a remedial action and therefore there is no increased short-term risk for this alternative. The short-term risks associated with Alternative 2 would be minimal since contaminants are not disturbed. Construction activities, such as building fences, would increase direct exposure to radionuclides, but this would be small compared to excavating activities.

Alternatives 3 and 4 would not pose an increased risk to the community because the remedial actions would occur at a remote location from the community. Alternative 4 would likely involve the transportation of soil along highways within the INEEL boundary, but this would still be isolated from public highways. Protecting site personnel from potential hazards arising from construction activities would be a concern under both alternatives. The primary concerns would be radiation exposure to the workers and the inhalation or ingestion of contaminants caused by the disturbance of soil. These risks would be mitigated by the use of appropriate personnel protective equipment or other engineered controls used during the construction. Preplanning work evolutions would also minimize the time exposed to radionuclides.

Some impacts to the environment during excavation and capping activities for Alternatives 3 and 4 would be unavoidable during construction. Overall, construction activities represent a controllable risk and would not present a significant negative impact to site flora and fauna in the vicinity of the excavation or cover construction. There are no known rare or endangered plants or animals in the vicinity of the excavation or cover areas. The area around NRF has been surveyed and some areas of archeological or historical value were found and identified as culturally sensitive. The excavation areas do not occur in these identified areas and, therefore, these known cultural areas would be excluded from remedial action activities. Although unlikely, the potential exists that unknown culturally sensitive areas could be disturbed during construction activities.

Since Alternative 3 excavates and handles less radioactive soil, it has better short-term effectiveness than Alternative 4, which requires much more soil to be excavated, packaged, and transported. Alternative 2 has the best short-term effectiveness, since only minimal time is spent at the sites of concern.

6.5 Reduction of Toxicity, Mobility, and Volume through Treatment

Treatment technologies were determined not to be practicable because they were ineffective, difficult to implement, and/or very costly. None of the alternatives use treatment as a remedial action and, therefore, do not reduce toxicity, mobility, or volume through treatment. Alternatives 3 and 4 do reduce mobility through containment.

6.6 Implementability

Each alternative is considered implementable. The remedial technologies of excavating, cover construction, land use restrictions, fencing, and monitoring have a proven reliability. The technologies associated with the alternatives are readily available, relatively simple, and easily constructed and maintained. The necessary equipment and specialized personnel would be available for any of the alternatives. The excavation, covering, and monitoring activities associated with Alternatives 3 and 4 can be conducted using common construction techniques. Alternatives 3 and 4 would have some limited impact on current site operations, increasing the difficulty in implementing the actions. These impacts include limiting access to portions of NRF during excavation and construction activities, the disruption of the NRF security fence, and modification of traffic patterns to implement the remedial actions. None of the actions would be expected to impact future operations. Alternative 2 would be the easiest to implement since

only minimal construction activities involving a small number of personnel and equipment would be necessary. Alternative 2 would have little impact on present site operations, but may have the greatest impact on future site operations, since various areas would be fenced off to prevent access. Alternative 4 would be the most difficult to implement because of the uncertainty in the availability of the various off-site (away from NRF) disposal options. Additional concerns with Alternative 4 include packaging and transportation to the disposal site.

6.7 Cost

Alternative 1 (No Action) would not entail any additional costs. The costs associated with Alternatives 2 and 3 include 30 years of monitoring. Most of the 30 year monitoring cost (approximately $2.8 million) is attributed to groundwater monitoring that is presently part of the Groundwater Monitoring Program at the NRF. This program was established in the ROD for OUs 8-05 and 8-06, Landfill Areas, and the identified cost does not necessarily represent an increased cost.

Alternative 2 would not require any excavation work. Alternative 3 would excavate an estimated total volume of 133,000 cubic feet of soil compared to 1,171,000 cubic feet for Alternative 4. Alternative 3 would excavate an estimated 58,000 cubic feet of contaminated soil compared to 447,000 cubic feet for Alternative 4. Each alternative would remove approximately 3,130 linear feet of pipe.

Alternative 4 represents the highest cost. Although Alternative 4 does not require long-term monitoring, significantly more contaminated soil (over seven times more) would be excavated in Alternative 4 than Alternative 3. Additional packaging and transportation of the soil would be required. These activities and the associated radiological controls represent the primary cost increase of Alternative 4 over Alternative 3. In addition, if disposal occurred away from NRF, disposal fees including overhead costs may be charged to NRF. Table 9 provides a summary of the costs in Net Present Value (in 1997 dollars) associated with each of the alternatives.

6.8 State Acceptance

The IDHW has been involved in the development and review of the NRF Comprehensive RI/FS, the Proposed Plan, and this ROD. All comments received from IDHW on these documents have been resolved and incorporated into these documents accordingly. In addition, IDHW has participated in public meetings where public comments and concerns have been received and responses offered.

The IDHW concurs with the selected remedial alternative for the sites contained in this ROD and is signatory to the ROD with DOE and EPA.

6.9 Community Acceptance

Community participation in the remedy selection process included participation in the public meetings held in January 1998 and review of the Proposed Plan during the public comment period of January 12 through March 12, 1998. Community acceptance is summarized in Section 7 and the Responsiveness Summary presented in Part III of this document. The Responsiveness Summary includes comments received either orally or in writing from the public, and the agencies' responses to these comments.

Table 9. Cost Summary for Each Alternative

OU 8-08 Alternative 2 Limited Action, Monitoring Cost Estimate

Cost Elements		Estimated Costs
RD/RA Management and Documentation Costs		
Overall Westinghouse Project Management[a]		$ 285,191
RA Construction Project Management (contractor)		$ 5,468
	Subtotal	**$ 290,659**
Construction Costs		
Access Restriction Fencing		$ 47,099
Contractor General Conditions (Includes Mobilization & Demobilization Costs)		$ 39,016
Contractor Overhead and Profit		$ 9,660
	Subtotal	**$ 95,775**
Operations and Maintenance Costs		
Oversite Management		$ 436,709
Operation & Maintenance[b]		$ 2,127,480
	Subtotal	**$ 2,564,189**
Net Present Value Cost (in 1997 dollars)		**$ 2,950,623**

(a) - RA Project Management and Oversight, Remedial Action Documents Preparation.

(b) - Includes 30 year Monitoring Costs. (Annual Net Present Value cost of $72,500 in 1997 dollars)

OU 8-08 Alternative 3 Limited Removal Capping Cost Estimate

Cost Elements		Estimated Costs
RD/RA Management and Documentation Costs		
Overall Westinghouse Project Management[a]		$ 572,325
RA Construction Project Management (contractor)		$ 334,730
	Subtotal	**$ 907,055**
Construction Costs		
Excavation		$ 267,674
Load and Haul		$ 59,642
Demolition, Pipes		$ 97,942
Demolition, Catch Basins/Manholes		$ 10,734
Demolition, Buildings		$ 70,207
Cap Construction		$ 551,604
Sampling and Analysis		$ 60,920
Access Restriction Fencing		$ 100,332
Additional Costs Incurred during Work involving Radiological Controls[b]		$ 2,075,530
Contractor General Conditions[c]		$ 776,113
Contractor Overhead and Profit		$ 441,437
	Subtotal	**$ 4,512,135**
Operations and Maintenance Costs		
Oversite Management		$ 1,359,081
Operation & Maintenance[d]		$ 2,127,480
	Subtotal	**$ 3,486,561**
Net Present Value Cost (in 1997 dollars)		**$ 8,905,751**

(a) - RA Project Management and Oversight, Remedial Design/Remedial Action Documents Preparation.

(b) - Work involving radiological controls includes excavation, demolition, loading and hauling, unloading and controlling soil in consolidation area, and decontamination. Additional costs associated with work involving radiological controls include labor costs (due to lower labor efficiency, additional manpower requirements, and additional training requirements), equipment costs (due to special or additional equipment required, decontamination of equipment, loss of equipment), and material costs (personnel protective equipment, containment materials, etc.).

(c) - Costs include mobilization and demobilization, subcontractor project management, various office equipment and personnel, safety equipment and clothing, sales tax, per diem, insurance, temporary office structures, construction signs, photography, and equipment rental. This generally represents a percentage of construction task costs, which for this alternative is 24%.

(d) - Includes 30 year Monitoring Costs. (Annual Net Present Value cost of $72,500 in 1997 dollars)

OU 8-08 Alternative 4 Removal/Offsite Disposal Cost Estimate

Cost Elements		Estimated Costs
RD/RA Management and Documentation Costs		
Overall Westinghouse Project Management[a]		$ 1,848,997
RA Construction Project Management (contractor)		$ 758,929
	Subtotal	**$ 2,607,926**
Construction Costs		
Excavation		$ 890,778
Landfill disposal fees[b]		$ 1,906,264
Landfill waste preparation and transportation costs[c]		$ 5,718,791
Demolition, Pipes		$ 98,138
Demolition, Catch Basins/Manholes		$ 10,755
Demolition, Buildings		$ 70,348
Sampling and Analysis		$ 163,392
Additional Costs Incurred during Excavation Work involving Radiological Controls		$ 3,301,286
Contractor General Conditions[d]		$ 2,955,332
Contractor Overhead and Profit		$ 1,327,085
	Subtotal	**$ 16,442,169**
Operations and Maintenance Costs		
Oversite Management		$ 4,037
Operation & Maintenance		$ 7,799
	Subtotal	**$ 11,836**
Net Present Value Cost (in 1997 dollars)		**$ 19,061,931**

(a) - RA Project Management and Oversight, Remedial Design/Remedial Action Documents Preparation.

(b) - Assumed disposal fee of approximately $100 per cubic yard. This is based on site experience and is an anticipated average cost associated with various disposal options away from NRF including an INEEL soil repository or off-INEEL commercial facility.

(c) - The actual transportation costs are estimated to be small compared to the waste preparation, packaging, sampling, etc., costs. This cost includes the additional costs associated with work involving radiological controls during preparation, packaging, sampling, etc. These additional costs include labor costs (due to lower efficiency, additional manpower requirements, and additional training requirements), equipment costs (due to special or additional equipment required, decontamination of equipment, loss of equipment), and material costs (personnel protective equipment, containment materials, etc.).

(d) - Costs include mobilization and demobilization, subcontractor project management, various office equipment and personnel, safety equipment and clothing, sales tax, per diem, insurance, temporary office structures, construction signs, photography, and equipment rental. This generally represents a percentage of construction task costs, which for this alternative is 24%.

6.10 Summary

The comparative analysis assesses the relative performance of the alternatives against the first seven evaluation criteria. Each alternative is evaluated individually against the threshold criteria and the primary balancing criteria. The modifying criteria was not used for the comparative analysis since the modifying criteria evaluates the state and public acceptance of the selected remedial action alternative after the comparative analysis is made. A comparative analysis summary indicates a relative ranking for each alternative in order to aid in identifying the recommended alternative. Alternative 1, which does not meet the threshold criteria of protection of human health and the environment and may not meet the threshold criteria of compliance with ARARs, and as such was eliminated from consideration. A comparison was not made for reduction of toxicity, mobility, or volume through treatment since none of the alternatives included treatment as an action.

Each of the alternatives, with the exception of the no action alternative, would meet the RAOs associated with the protection of human health. Alternative 2, Limited Action, may not meet the RAOs for protection of environmental receptors. The risk assessment given in the NRF Comprehensive RI/FS showed that preventing access to and direct contact with the contaminated soil would be protective of human health. Preventing access to the areas of concern would place the receptor at a sufficient distance that external exposure to radionuclides would not be a pathway of concern. These restrictions on access to the area would also prevent soil ingestion and food crop ingestion associated with the contaminated soil. Alternative 2 was determined that it may not meet the ARAR requirements associated with controlling fugitive dust and air pollution, although there is no evidence that specific regulatory levels would be violated. Alternatives 3 and 4 meet all RAOs and provide overall protection of human health and the environment. Both alternatives meet all ARARs established for each alternative. Based on the criteria given in Section 6.0, Alternative 3 (Limited Excavation, Disposal, and Containment) was ranked higher than Alternative 4 (Complete Excavation and Off-site Disposal) because of more favorable comparative ratings due to lower costs, easier implementation, and better short-term effectiveness. Based on the above information and comparative analysis, Alternative 3 was the recommended selected remedial action for the sites of concern.

7.0 Highlights of Community Participation

In accordance with CERCLA §113(k)(2)(B)(i-v) and §117, a series of opportunities for public information and participation in the investigation and decision process for WAG 8 was provided to the public from September 1995 through March 1998. The opportunities to obtain information and provide input included *INEEL Reporter* newsletter articles (a publication on the INEEL's Environmental Restoration Program); Citizens' Guide supplemental updates; a proposed plan; focus group interactions, which included teleconference calls, briefings, and presentations to interest groups; and public meetings. In addition, several public involvement activities were conducted during previous investigations including an RI/FS and two small removal actions. The ROD for the Industrial Waste Ditch (OU 8-07) and Landfill Areas (OUs 8-05 and 8-06) contains a summary of the public involvement activities that were associated with these former investigations at NRF.

Regular reports concerning the status of the project were included in bimonthly issues of the *INEEL Reporter* and were mailed to those on the mailing list. Reports also appeared in two issues of a *Citizen's Guide* to environmental restoration at the INEEL in early 1996 and 1997 and one issue of *Environmental Restoration Progress, A Status Report of Environmental Cleanup at INEEL* in February 1998. Both of these reports are supplements to the *INEEL Reporter.*

On January 12, 1998, DOE issued a news release to more than 100 contacts concerning the beginning of a 30-day public comment period pertaining to the NRF Comprehensive Proposed Plan. This comment period began on January 12, 1998. In response to a request from the public, the comment period was extended 30 days and ended on March 12, 1998. Many of the news releases resulted in a short note in community calendar sections of newspapers and public service announcements on radio stations. The news release gave notice to the public that NRF investigative documents would be available from the beginning of the comment period. These documents were available in the Administrative Record section of the INEEL Information Repositories located in the INEEL Technical Library in Idaho Falls and public libraries in Fort Hall and Moscow.

The types of public participation used in the decision-making process for the public included receiving the proposed plan, receiving telephone calls, attending the availability sessions one-half hour before public meetings to informally discuss the issues, and submitting oral and written comments to the agencies during the 60-day public comment period. At the request of the Shoshone-Bannock Tribes, a briefing on the proposed plan was given to Tribal members and their technical staff at Fort Hall in January 1998. A briefing of the proposed plan was also given to a subcommittee of the Idaho National Engineering and Environmental Laboratory Citizens Advisory Board in December 1997 and was followed up with a presentation to the whole board in January 1998. The advisory board is made up of individuals representing the citizens of Idaho who make recommendations to DOE, EPA, and the State of Idaho regarding environmental activities at the INEEL.

Copies of the proposed plan were mailed on January 6, 1998 to 700 members of the public on the INEEL Community Relations mailing list and approximately 50 people not on the mailing list, urging citizens to comment on the proposed plan and to attend public meetings. Display advertisements announcing the availability of the proposed plan, the locations of public meetings, and comment period extensions appeared in six regional newspapers during the weeks of January 11 and February 8 in Boise, Fort Hall, Idaho Falls, Moscow, Pocatello, and Twin Falls. Large display advertisements appeared in the following newspapers: the Idaho Statesman (Boise); the Sho-Ban News (Fort Hall); the Post Register (Idaho Falls); the Daily News (Moscow); the Idaho State Journal (Pocatello); and the Times News (Twin Falls).

A series of three news releases and newspaper advertisements, including the notice of the extension of the comment period, provided public notice of these public involvement activities. Offerings for briefings and the 30-day public comment period (including the 30-day extension of the comment period) that was to begin January 12 and end March 12, 1998 were also announced. Personal telephone calls were made to stakeholders in Idaho Falls, Pocatello, Boise, and Moscow areas the weeks of January 5 and 12 to remind individuals about the meetings and to see if a briefing was desired.

Written comment forms (including a postage-paid business-reply form) were available to those attending the public meetings. The forms were used to submit written comments either at the meeting or by mail. The reverse side of the meeting agenda contained a form for the public to use in evaluating the effectiveness of the meetings. A court reporter was present at each meeting to record discussions and public comments. The meeting transcripts were placed in the Administrative Record section for WAG 8, OU 8-08, in three INEEL Information Repositories. For those who could not attend the public meetings, but wanted to make formal written comments, a postage-paid written comment form was attached to the proposed plan.

Public meetings were held on January 20 in Boise, January 21 in Moscow, and January 22, 1998 in Idaho Falls. Also on January 21, a briefing was given to a risk assessment class at the University of Idaho. Approximately 80 people not associated with the project attended the public meetings. Overall, 12 citizens provided formal comments; of these, three citizens provided oral comments, and 11 provided written comments (two citizens provided oral and written comments). All comments received on the proposed plan were specifically considered during the development of this ROD. The agencies appreciate the public's participation in this process and acknowledge the value of public comment. A Responsiveness Summary has been prepared as part of the ROD. The formal oral comments presented at the public meetings and written comments are included in Part III of this ROD and in the Administrative Record for NRF.

8.0 Selected Remedy

The results of the NRF Comprehensive RI/FS identified nine sites of concern where an unacceptable or potentially unacceptable risk to human health exists. Those sites that contain or potentially contain contaminants resulting in an increased cancer risk greater than 1 in 10,000 to a future 100-year resident or lead concentrations above suggested screening levels for cleanup represent an unacceptable risk. There are 55 other sites that have no risk or an acceptable risk and do not require a remedial action. Based on the consideration of the requirements of CERCLA, the detailed analysis of alternatives, and public comments, DOE, EPA, and IDHW have selected the alternatives as described in the following sections.

8.1 No Action/No Further Action Sites

Based on Track 1 and Track 2 investigations and the RI/FS evaluation, a No Action decision is made by the agencies for those sites with no source present or a source present that represents an acceptable risk for unrestricted use. This "No Action" decision means no future evaluations or followups are required.

Based on the same information, a No Further Action decision is made by the agencies for those sites with a source or potential source present, but for which an exposure route is not available under current conditions. This "No Further Action" decision means that the site will be included in a CERCLA review performed at least every five years to ensure that site conditions used to evaluate the site have not changed and to verify the effectiveness of the No Further Action decision. All monitoring data collected from the No Further Actions sites will be included in the CERCLA five year review. Although no additional remedial action is required at this time, present institutional controls, such as current fencing and administrative controls on excavation, will be maintained. If site conditions change, including present institutional controls, additional sampling, monitoring, or action will be considered.

The following sites are defined as No Action or No Further Action sites.

NO ACTION SITES:

Operable Unit 8-01

- NRF-03, ECF Gravel Pit
- NRF-06, Southeast Landfill
- NRF-08, North Landfill
- NRF-33, South Landfill
- NRF-40, Lagoon Construction Rubble
- NRF-41, East Rubble Area
- NRF-63, A1W Construction Debris Area

Operable Unit 8-02

- NRF-09, Parking Lot Runoff Leaching Trenches
- NRF-37, Old Painting Booth
- NRF-38, ECF French Drain
- NRF-47, Site Lead Shack (Building #614)
- NRF-52A, Old Lead Shack (Location #1)
- NRF-52B, Old Lead Shack (Location #2)
- NRF-54, Old Boilerhouse Blowdown Pit
- NRF-55, Miscellaneous NRF Sumps and French Drains

- NRF-64, South Gravel Pit
- NRF-68, Corrosion Area Behind BB11

Operable Unit 8-03

- NRF-10, Sand Blasting Slag Trench
- NRF-15, S1W Acid Spill Area
- NRF-18B, S1W Spray Pond #2 and A1W Cooling Tower
- NRF-20, A1W Acid Spill Area
- NRF-45, Site Incinerator
- NRF-56, Degreasing Facility

Operable Unit 8-04

- NRF-28, A1W Transformer Yard
- NRF-29, S5G Oily Waste Spill
- NRF-31, A1W Oily Waste Spill
- NRF-44, S1W Industrial Wastewater Spill Area
- NRF-58, S1W Old Fuel Oil Tank Spill
- NRF-62, ECF Acid Spill Area
- NRF-65, Southeast Corner Oil Spill
- NRF-69, Plant Service Underground Storage Tank (UST) Diesel Spill
- NRF-70, Boiler House Fuel Oil Release
- NRF-71, Plant Service UST Gasoline Spill
- NRF-72, NRF Waste Oil Tank
- NRF-73, NRF Plant Services Varnish Tank
- NRF-74, Abandoned UST's Between the NRF Security Fences
- NRF-75, Fuel Oil Revetment Oil Releases
- NRF-76, Vehicle Barrier Removal
- NRF-77, A1W Fuel Oil Revetment Oil Releases

Operable Unit 8-08

- NRF-13, S1W Temporary Leaching Pit
- NRF-32, S5G Basin Sludge Disposal Bed
- NRF-79, ECF Water Pit Release

Operable Unit 8-09

- Interior Industrial Waste Ditch

NO FURTHER ACTION SITES:

Operable Unit 8-02

- NRF-42, Old Sewage Effluent Ponds
- NRF-61, Old Radioactive Materials Storage and Laydown Area

Operable Unit 8-03

- NRF-18A, S1W Spray Pond #1
- NRF-22, A1W Painting Locker French Drain

Operable Unit 8-08

- NRF-02, Old Ditch Surge Pond
- NRF-16, Radiography Building Collection Tanks
- NRF-23, Sewage Lagoons
- NRF-43, Seepage Basin Pumpout Area
- NRF-66, Hot Storage Pit
- NRF-81, A1W Processing Building Area Soil

No Operable Unit (new sites identified after RI/FS)

- NRF-82, Evaporator Bottoms Tank Release
- NRF-83, ECF Hot Cells Release Area

8.2 Selected Remedy for Sites of Concern

The following sites were determined by the NRF Comprehensive RI/FS to be sites of concern:

- NRF-11, S1W Tile Drainfield and L-shaped Sump
- NRF-12A, Underground Piping to Leaching Pit
- NRF-12B, S1W Leaching Pit
- NRF-14, S1W Leaching Beds
- NRF-17, S1W Retention Basins
- NRF-19, A1W Leaching Bed
- NRF-21A, Old Sewage Basin
- NRF-21B, Sludge Drying Bed
- NRF-80 A1W/S1W Radioactive Line Near BB19

The Limited Excavation, Disposal, and Containment alternative (Alternative 3) is selected for the nine sites of concern. Alternative 3 best satisfies the nine evaluation criteria. The Limited Action alternative (Alternative 2) may not be protective of ecological receptors and would have a potential impact on future site operations by eliminating access to various portions of NRF. Alternative 3 was evaluated to be equally protective of human health and the environment as the Complete Excavation and Off-site Disposal alternative (Alternative 4). Alternative 3 will comply with all ARARs. In addition, Alternative 3 has greater short-term effectiveness, is easier to implement, and costs less than Alternative 4. Alternative 3 was also supported by the State of Idaho and generally had community acceptance. The major components of the selected remedy for the nine sites of concern include:

- Excavating contaminated soil above remediation goals and debris from six of the nine sites;
- Consolidating the excavated soil at one site (S1W Leaching Beds);
- Disposing of radiological, non-hazardous debris to an INEEL disposal facility or an appropriate off-site (away from INEEL) disposal facility and, if necessary, disposing of radiological, hazardous debris as a mixed waste per the INEEL Site Treatment Plan;
- Constructing engineered covers primarily of native earthen materials in two areas that would cover the three sites not excavated, which includes the site where soil was consolidated. Cover materials will be determined in the Remedial Design/Remedial Action Work Plan;
- Radiation surveys and soil sampling during excavation;
- Soil and groundwater sampling to monitor any potential releases from the covered areas;

- Periodic inspection and maintenance of covers to ensure their integrity;
- Establishing fencing or other barriers and land use restrictions.

Soil above 16.7 pCi/g of cesium-137 and 45.6 pCi/g of strontium-90 will be removed from sites NRF-11, NRF-12A, NRF-17, NRF-21A, NRF-21B, and NRF-80, if present. Lead was detected above remediation goals in only one sample in a location where a cover will be placed. As explained in Section 5.1, remediating the soil to below remediation goals for cesium-137 and strontium-90 will also reduce the risks associated with other radiological contaminants of concern. NRF-11, NRF-12A, NRF-17, NRF-21A, NRF-21B, and NRF-80 contain underground piping or concrete structures that are planned for removal during decontamination and dispositioning activities at NRF. Disposal of pipe and concrete debris will be through current decontamination and dispositioning practices and will likely be sent to the RWMC located at the INEEL. Sampling concurrent with excavation activities will ensure all soil above remediation goals is removed. After the soil is excavated, it will be placed in NRF-14 (S1W Leaching Beds). The estimated contaminated soil volume from all the proposed excavation areas will fit into the present leaching beds. A single engineered earthen cover will cover NRF-14 and the adjacent NRF-12B (S1W Leaching Pit). Another cover will be placed over site NRF-19 (A1W Leaching Bed). The cover design will be determined during the remedial design phase, but will likely include soil, gravel cobble, and/or rip-rap to ensure proper containment of contaminants. Performance goals established for the proposed cover were given in Section 5.2.3.

This alternative includes operation and maintenance costs for long-term maintenance and monitoring of the covers. Institutional controls including fencing or other barriers and land use restrictions will be implemented to prevent access to the covered areas. A description of the areas where access will be restricted, the specific controls (e.g., fences, signs) that will be used to ensure that access will be restricted, the types of activities that will be prohibited in certain areas (e.g., excavation), and the anticipated duration of such controls will be determined during the remedial design phase and will be incorporated into the SDP. This information will be submitted to the EPA and IDHW once it has been placed in the SDP. As appropriate, NRF shall also provide the Bureau of Land Management or other Federal agencies the detailed description of the controls identified above. Long-term monitoring of NRF groundwater via the present groundwater well network and monitoring of soil around the covered areas will be performed. A review will be conducted at least every five years as required by CERCLA to verify the effectiveness of the selected remedy. Contingency actions would include off-site (away from NRF) disposal of soil that exceeds the capacity of NRF-14 or continued consolidation at NRF-14 above surface level, although these are unlikely to be necessary. The remedial actions will be performed in accordance with all ARARs. See Section 5.2.3 for a more detailed discussion of Alternative 3.

9.0 Statutory Determination

The selected remedies (including No Action and No Further Action decision sites) meet the statutory requirements of CERCLA Section 121, the regulations contained in the NCP, and the requirements of the FFA/CO for the INEEL. All remedies meet the threshold criteria established in the NCP (i.e., protection of human health and the environment and compliance with ARARs). CERCLA also requires that the remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable, and that the implemented action be cost effective. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy addresses these statutory requirements.

9.1 Protection of Human Health and the Environment

As described in Section 8, the selected remedy for the sites of concern satisfies the criterion of overall protection of human health and the environment.

9.1.1 No Action/No Further Action Sites

For the 55 No Action and No Further Action sites covered by this ROD, no remedial action is necessary to ensure continued protection of human health and the environment. The 55 sites are identified in Section 8. The 43 No Action sites have no risk or an acceptable risk to human health and the environment were they to be released for unrestricted use, and therefore No Action is justified. The 12 No Further Action sites contain sources or potential sources that may pose unacceptable risks to human health and the environment, but an exposure pathway is not available, thus providing overall protection of human health and the environment. Because a source may still be present at the 12 No Further Action sites, a review will be performed every five years to ensure the No Further Action decision remains protective of human health and the environment.

9.1.2 Limited Excavation, Disposal, and Containment

Limited Excavation, Disposal, and Containment is the selected remedy for the nine sites of concern. This remedy satisfies the criterion of overall protection of human health and the environment by preventing direct contact with the contaminated soils by all potential receptors, reducing radiation external exposure through shielding by the cover, and reducing the likelihood of biointrusion.

9.2 Compliance with ARARs

The Limited Excavation, Disposal, and Containment remedy for the nine sites of concern will meet all federal and state ARARs. The selected remedy will be designed to comply with all action-specific, location-specific, and chemical-specific federal and state ARARs, as presented in Table 10.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law which specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those same standards mentioned for applicable requirements, except while not applicable at the CERCLA site, address problems or situations sufficiently similar to those encountered at the site such that their use is well suited to the particular site.

Three types of ARARs exist: location-specific, action-specific, and chemical-specific. In general, location-specific ARARs place restrictions on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations. Action-specific ARARs are usually technology or activity based requirements or limitations on actions or conditions involving specific substances. Chemical-specific ARARs are health or risk-based numerical values or methodologies that result in the establishment of numerical values. The values establish the acceptable concentrations of chemicals or substances that may be found in or discharged to the environment.

9.2.1 Location-specific ARARs

The Idaho State Historical Society has identified the INEEL as containing properties potentially eligible for the National Register of Historic Places (NRHP). Several structures at NRF are eligible for the NRHP including NRF-17 (S1W Retention Basins) and, therefore, the National Historic Preservation Act (NHPA) (16 USC 470) is considered applicable for the remedial action associated with NRF-17. A final designation under the NRHP would mean this site must be accorded the same protection under the NHPA as a site listed under the Act. All applicable requirements established under the NHPA will be followed for remedial actions associated with NRF-17. Administrative controls are in place at NRF to ensure the requirements are met.

9.2.2 Action-specific ARARs

The action-specific ARARs identified for the sites of concern are listed in Table 10. The Idaho Fugitive Dust Emission (IDAPA 16.01.01.651) requirements are applicable due to the disturbance of soil at these sites. Because of the potential of encountering hazardous wastes in the debris that leaves the area of contamination (AOC) during the remedial action activities (i.e., demolition and disposal), state regulations (with reference to the specific sections in the federal regulations) concerning hazardous waste identification (IDAPA 16.01.05.005) and determination (IDAPA 16.01.05.006.01) are considered applicable. These requirements for hazardous waste management become applicable for the debris generated during the remedial work activities because the debris must be transported off the NRF site; therefore, the debris must be characterized for the presence of hazardous constituents for proper disposal. The land disposal restrictions (IDAPA 16.01.05.011) will be applicable in the event that the debris leaving the AOC is found to contain hazardous wastes.

Portions of the state regulation (IDAPA 16.01.05.008) with reference to the specific federal regulations as listed in Table 10, pertaining to surveying, closure, and post closure care requirements for RCRA landfill sites are considered relevant and appropriate for the two CERCLA sites identified to be capped with an engineered cover under the selected remedy, Alternative 3. Since the two sites to be capped were not fully characterized, there remains an uncertainty concerning the types and quantity of wastes that may remain in place. Therefore, the specific regulatory sections pertaining to the closure and post closure care requirements as listed in Table 10 are considered relevant and appropriate. The specific regulatory section pertaining to surveying requirements for identifying the exact locations and dimensions of the boundaries for the capped areas with respect to permanently surveyed benchmarks is also considered relevant and appropriate. Although unlikely, in the case where contaminated debris generated during the remedial work activities could be transported off the INEEL to an EPA approved disposal facility, the procedures for planning and implementing off-site (away from INEEL) response actions (40 CFR 300.440) are considered applicable.

Table 10. ARAR and To-be-Considered List

Title	Citation	Relevancy
Location-Specific		
National Historic Preservation Act	16 USC 470	Applicable
Action-Specific		
Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities [Specific Appropriate Federal Regulation Sections: Surveying, Closure and Post Closure Care for Landfills]	IDAPA 16.01.05.008 [40 CFR 264.309(a), 40 CFR 264.310(a)(1)(2)(3)(4)(5) and 40 CFR 264.310(b)(1)(4)(5)(6)]	Relevant & Appropriate
Identification and Listing of Hazardous Waste (Specific Applicable Federal Regulation)	IDAPA 16.01.05.005 (40 CFR 261)	Applicable
Standards Applicable to Generators of Hazardous Waste (Specific Applicable Federal Regulation Section: Hazardous Waste Determination)	IDAPA 16.01.05.006.01 (40 CFR 262.11)	Applicable
Land Disposal Restrictions (Specific Applicable Federal Regulation Sections)	IDAPA 16.01.05.011 (40 CFR 268.7, .9, .40, .45, and .48)	Applicable
Procedures for Planning and Implementing Off-site Response Actions	40 CFR 300.440	Applicable
Idaho Fugitive Dust Emissions	IDAPA 16.01.01.651	Applicable
Chemical-Specific		
National Emission Standards for Hazardous Air Pollutants	40 CFR 61.92	Applicable
Increments for Toxic Air Pollutants	IDAPA 16.01.01.585 & .586	Applicable
Idaho Groundwater Quality Rule	IDAPA 16.01.11.200.01(a)	Relevant & Appropriate

To-Be-Considered List	
Environmental Protection, Safety and Health Protection Standards	DOE Order 5480.4
Low-level Radioactive Waste Management	DOE Order 5820.2A
Radiation Protection of the Public and Environment	DOE Order 5400.5
Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities	EPA Guidance Document

9.2.3 Chemical-specific ARARs

The chemical-specific ARARs identified for the sites of concern are also listed in Table 10. Because of the potential for the release of contaminants (radionuclides) into the air from the remedial work activities involving soil movement and consolidation under the selected remedy, the emission standard for radionuclide emissions to ambient air under the National Emissions Standards for Hazardous Air Pollutants (40 CFR 61.92) are applicable. The State of Idaho's increments for toxic air pollutants (IDAPA 16.01.01.585 and 586) are considered applicable because of the potential for the release of some of the listed contaminants into the air during excavation activities. In addition, the Idaho Groundwater Quality Rule (IDAPA 16.01.11.200.01 (a)) is considered to be relevant and appropriate due to the potential, although not likely, for the migration of contaminants into the aquifer. The selected remedy provides for long term monitoring of the aquifer beneath NRF. The Idaho Groundwater Quality Rule includes a wide variety of constituents, including radiological constituents, with limits based on the protection of human health.

9.2.4 To-be-Considered Guidance

Table 10 also lists other requirements, procedures, and guidance documents. The DOE Orders stem from DOE's policy for implementing legally applicable protection standards and to consider and adopt, as appropriate, recommendations by authoritative organizations. Since the identified DOE Orders cover areas (i.e., low-level radioactive waste management, radiation protection) that may be relevant for the selected remedy, these Orders will be considered and adopted as appropriate. Since lead has been detected at one of the sites of concern, the EPA guidance document will be useful in providing guidance for the selected remedy.

9.3 Cost Effectiveness

The selected remedial action (Limited Excavation, Disposal, and Containment) for the nine sites of concern is cost effective because it is protective of human health and the environment, achieves ARARs, and the costs are proportional to the effectiveness in meeting remedial action objectives. Although the selected remedy costs more than a limited action remedy, it protects ecological receptors, reduces the area footprint of soil requiring monitoring, and provides more efficient control measures (i.e., engineered cover) to prevent direct contact by receptors with contaminated soils. The selected remedy costs significantly less than the excavation and off-site (away from NRF) disposal option. Although the excavation and off-site disposal option completely removes the source from NRF, costs for packaging, transportation, disposal fees, and excavating over seven times more contaminated soil are considerably higher than the selected remedy. In addition, the short-term effectiveness for excavating and off-site disposal is considerably less since a much larger amount of contaminated soil would be handled for a longer period of time causing an increased risk for construction workers.

9.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Possible

The selected remedy will result in the permanent removal of contaminated soil from six of the nine sites of concern. For the sites contaminated with radionuclides, effective treatment technologies are currently unavailable; therefore, the preference for permanent solutions cannot be met except through natural radioactive decay processes over time. Treatment technologies were determined not to be practicable because they were ineffective, difficult to implement, and/or very costly. Since contaminated soils will remain on site, the selected remedy will not result in a permanent solution for the three sites where contaminated soil will be covered with an engineered cover. The selected remedy is a permanent solution for the six sites where contaminants are permanently removed through soil excavation.

9.5 Preference for Treatment as a Principal Element

The statutory preference for remedies that employ treatment as a principal element will not be met. The treatment technologies considered during remedial action development were not considered to be a technically or cost effective means for reducing risks to human health and the environment. Natural radioactive decay will result in the reduction of contaminant concentrations.

10.0 Documentation of Significant Changes

CERCLA Section 117(b) requires that an explanation of any significant changes from the preferred alternative originally presented in the Proposed Plan be provided in the ROD. A few changes have been made in the ROD that are different than presented in the Proposed Plan. Although the changes may not be considered significant, they are included in this section of the ROD to accurately reflect modifications made to the Proposed Plan.

Two new sites have been identified in this ROD. One of the two sites, NRF-82, was identified as a CERCLA site immediately after issuing the Final Comprehensive RI/FS; a description and recommendation were included in the Proposed Plan. The other site, NRF-83, was identified as a CERCLA site after the Proposed Plan and is included in this ROD.

NRF-83, ECF Hot Cells Release Area, is an area where cobalt-60 and cesium-137 were discovered in the soil below a concrete trench at ECF during a construction project. All accessible contaminated soils adjacent to the trench were removed during the construction project and replaced with clean soil. Contaminated soils below the trench were not removed to preserve the integrity of the trench structure. The trench was not removed and, therefore, an exposure pathway to a potential receptor does not exist making the estimated risk low. A Track 1 investigation has been issued for the site and is available in the Administrative Record for NRF. The remaining risk at NRF-83 is estimated to be low because the presence of the trench prevents exposure to remaining constituents. Therefore, this site has been designated as a No Further Action site. Because an exposure route does not exist for NRF-83, this site would not impact the comprehensive assessment performed for NRF.

Site NRF-18, S1W Spray Ponds, was identified in the Proposed Plan as a single site. NRF-18 was proposed to be a No Further Action site because the concrete spray ponds would eliminate any exposure pathway to contaminants below the basin. In addition, sampling data from around the spray pond indicated an acceptable risk at the spray pond, but uncertainty existed in the assessment because sample data below the spray ponds was not available. Since the issuance of the Proposed Plan, additional samples have been collected, analyzed, and evaluated from the soil below and around Spray Pond #2 (north spray pond) in preparation for demolition of Spray Pond #2. The additional information for Spray Pond #2 allowed a more detailed assessment of Spray Pond #2. Therefore, NRF-18 was split into two sites: NRF-18A (S1W Spray Pond #1) and NRF-18B (S1W Spray Pond #2 and A1W Cooling Tower). NRF-18B includes the A1W Cooling Tower, which, unlike the spray ponds, did not have a groundwater concern because of leakage. The risk at the A1W Cooling Tower through surface pathways was estimated to be low based on a Track 1 risk evaluation. The A1W Cooling Tower was demolished in 1995. NRF-18A includes portions of the fire protection system that was connected to the spray ponds and cooling tower and was suspected to have leaked on occasion.

Samples were collected from several boreholes drilled through and around Spray Pond #2. Sample data showed only slightly elevated levels of chromium, which was the primary contaminant of concern at Spray Pond #2. No elevated amounts of radionuclides were detected. An updated assessment was issued for NRF-18B showing a low estimated risk associated with Spray Pond #2 and the A1W Cooling Tower, with much less uncertainty than the original assessment. The updated assessment indicates NRF-18B is a No Action site instead of a No Further Action site as stated for all the original NRF-18 in the Proposed Plan. NRF-18A will remain a No Further Action site until additional data are available to more accurately assess it. The new data collected for Spray Pond #2 shows the cumulative risk assessment to be more conservative than originally indicated since actual contaminant concentrations were less than concentration terms used in the cumulative risk assessment.

The Proposed Plan indicated that there were nine sites of concern and 62 other identified release or potential release sites at NRF, for a total of 71 sites. Fifty-two of the 62 sites were proposed as No Action or No Further Action sites and the other ten sites were associated with a previous ROD, thus requiring no recommendation in the Proposed Plan. The current ROD (this document) identifies all 87 sites at NRF, to more completely show the comprehensive nature of the NRF Comprehensive RI/FS. The 71 sites identified in the Proposed Plan did not include the 13 No Action COCA sites, the new site (NRF-83) discussed above, or the splitting of sites NRF-18 and NRF-52. NRF-52 was evaluated as NRF-52A and 52B during past Track 1 investigations, but the Proposed Plan failed to identify NRF-52 as two separate sites. Hence, 71 sites (Proposed Plan) plus 13 sites (COCA) plus a new site (NRF-83) plus two additional sites (splitting NRF-18 and NRF-52 into two sites each) equals 87 total sites.

The 13 COCA sites were included in the comprehensive assessment of NRF, but were initially screened out because they lacked a source. The Proposed Plan shows 41 No Action sites and 11 No Further Action sites (52 total). The ROD revises these to 43 No Action sites (includes NRF-18B and both NRF-52 sites) and 12 No Further Action sites (includes NRF-83), for a total of 55.

The Proposed Plan indicated that 316,470 cubic feet of contaminated soil would be excavated under Alternative 4. The actual estimate of soil to be excavated is now 1,170,890 cubic feet, of which 446,550 cubic feet would be contaminated soil. The volume given in the Proposed Plan failed to include additional contaminated soil (130,080 cubic feet) to be excavated near the S1W Leaching Beds (NRF-14) and S1W Leaching Pit (NRF-12B). Although the volume was not correct in the discussion of Alternative 4, the cost estimate provided in the Proposed Plan was based upon the correct volume of soil.

PART III
RESPONSIVENESS SUMMARY

A Summary of Comments Received During the Public Comment Period

OVERVIEW

The Naval Reactors Facility (NRF) constitutes Waste Area Group (WAG) 8 at the Idaho National Engineering and Environmental Laboratory (INEEL). There have been 87 release or potential release sites and nine operable units (OU) identified at NRF. OU 8-08 was the last OU to be investigated and represents the NRF Comprehensive Remedial Investigation/Feasibility Study (RI/FS) including 18 sites not previously assessed. Twenty-three of the 87 sites were included in previous decision documents. Selected remedies were chosen for the remaining 64 sites in this Record of Decision (ROD). Nine of the 64 sites have been identified as sites of concern that pose or potentially pose unacceptable risks to human health and the environment. The other 55 sites were determined to pose no risk or an acceptable risk to human health or the environment and were identified by the agencies to require no additional action. For the nine sites of concern, remedial action alternatives were evaluated, and a preferred alternative was selected. A Proposed Plan that summarized the results of the NRF Comprehensive RI/FS and presented the preferred remedial alternative was released by the agencies for public review on January 6, 1998. Public comment on this document started on January 12, 1998, and was extended until March 12, 1998 due to a request from the public. Public meetings were held in Boise, Moscow, and Idaho Falls, Idaho, on January 20, 21, and 22, 1998, respectively.

This Responsiveness Summary responds to both written and oral comments received during the public comment period and meetings. Generally, support for the preferred alternative was favorable with concerns from commentors over the mobility of contaminants and the construction design of the proposed covers.

BACKGROUND ON COMMUNITY INVOLVEMENT

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §113(k)(2)(B)(i-v) and §117, a series of opportunities for public information and participation in the investigation and decision process for WAG 8 was provided to the public from September 1995 through March 1998. The opportunities to obtain information and provide input included *INEEL Reporter* newsletter articles (a publication on the INEEL's Environmental Restoration Program), *Citizens' Guide* supplemental updates, a proposed plan, focus group interactions, which included teleconference calls, briefings and presentations to interest groups, and public meetings.

Regular reports concerning the status of the project were included in bimonthly issues of the *INEEL Reporter* and were mailed to those on the mailing list. Reports also appeared in two issues of the *Citizen's Guide* to environmental restoration at the INEEL in early 1996 and 1997 and one issue of *Progress a Status Report of Environmental Cleanup at INEEL* in February 1998. Both of these reports are supplements to the *INEEL Reporter.*

On January 12, 1998, U.S. Department of Energy (DOE) issued a news release to more than 100 contacts concerning the beginning of a 30-day public comment period pertaining to the NRF Proposed Plan. This comment period began on January 12, 1998. In response to a request

from the public, the comment period was extended 30 days and ended on March 12, 1998. The news release gave notice to the public that NRF investigative documents would be available from the beginning of the comment period. These documents were available in the Administrative Record section of the INEEL Information Repositories located in the INEEL Technical Library in Idaho Falls and public libraries in Fort Hall and Moscow.

Copies of the proposed plan were mailed on January 6, 1998 to 700 members of the public on the INEEL Community Relations mailing list, urging citizens to comment on the proposed plan and to attend public meetings. Public meetings were held at Boise, Moscow, and Idaho Falls, on January 20, 21, and 22, 1998, respectively. Written comment forms were available at the meetings, and a court reporter was present at each meeting to record transcripts of discussions and public comments. A total of about 80 people not associated with the project attended the public meetings. Overall, 12 citizens provided formal comments; of these, three citizens provided oral comments and 11 provided written comments (two citizens provided oral and written comments). Comments were also received from the INEEL Citizens Advisory Board and are included in this Responsiveness Summary.

This Responsiveness Summary has been prepared as a part of the ROD. The ROD presents the preferred alternative for the nine sites of concern and the recommendation of No Action or No Further Action for 55 other sites. The preferred alternative was selected in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (the National Contingency Plan). The decisions presented in the ROD are based on information contained in the Administrative Record. All formal oral comments, as given at the public meetings, and all written comments, as submitted, are included in the Administrative Record for the ROD.

LISTING OF COMMENTORS, COMMENT NUMBERS, AND PAGE NUMBERS

All of the formal comments submitted by the public in either written or oral form were tabulated and assigned a comment number. Where applicable, the commentors are listed alphabetically in the first column; the affiliation of the commentor is given in the second column (if no known affiliation, identified as "concerned citizen"); the comment number appears in the third column; and the page the comment and response begins can be found in the last column.

NAME	AFFILIATION	COMMENT #	PAGE #
Beatrice Brailsford	Snake River Alliance	27	103
Beatrice Brailsford	Snake River Alliance	28	104
Beatrice Brailsford	Snake River Alliance	29	104
Chuck Broscious	Environmental Defense Institute	6	90
Chuck Broscious	Environmental Defense Institute	7	91
Chuck Broscious	Environmental Defense Institute	8	91
Chuck Broscious	Environmental Defense Institute	9	92
Chuck Broscious	Environmental Defense Institute	10	92
Chuck Broscious	Environmental Defense Institute	11	93
Chuck Broscious	Environmental Defense Institute	12	93
Chuck Broscious	Environmental Defense Institute	13	94
Chuck Broscious	Environmental Defense Institute	14	95
Chuck Broscious	Environmental Defense Institute	15	95
Chuck Broscious	Environmental Defense Institute	16	96
Chuck Broscious	Environmental Defense Institute	17	97
Chuck Broscious	Environmental Defense Institute	18	98
Chuck Broscious	Environmental Defense Institute	19	98
Chuck Broscious	Environmental Defense Institute	20	99
Chuck Broscious	Environmental Defense Institute	21	99
Chuck Broscious	Environmental Defense Institute	22	100
Charles B. Greer	concerned citizen	1	88
Walt Hampton	concerned citizen	25	102
Martin Huebner	Coalition 21	36	106
KayLin Loveland	Envirocare of Utah, INC.	31	105
KayLin Loveland	Envirocare of Utah, INC.	32	105
KayLin Loveland	Envirocare of Utah, INC.	33	105
KayLin Loveland	Envirocare of Utah, INC.	34	106
KayLin Loveland	Envirocare of Utah, INC.	35	106
Swen Magnuson	concerned citizen	23	101
Swen Magnuson	concerned citizen	24	102
Joe Merted	concerned citizen	42	109
Charles M. Rice	Citizens Advisory Board	39	107
Charles M. Rice	Citizens Advisory Board	40	108
Buck Sisson	concerned citizen	2	88
Buck Sisson	concerned citizen	3	89
Buck Sisson	concerned citizen	4	90
Buck Sisson	concerned citizen	5	90
Buck Sisson	concerned citizen	41	108
Dianne Thompson	concerned citizen	30	104
Thomas D. Van Liew	concerned citizen	37	107
Thomas D. Van Liew	concerned citizen	38	107
Unknown	concerned citizen	26	102

SUMMARY OF COMMENTS WITH RESPONSES

Comments presented during the public comment period on the Proposed Plan for the NRF Comprehensive RI/FS are given below. The public meetings were divided into a brief presentation, an informal question-and-answer session, and a formal public comment session. The meeting format was described in published announcements, and meeting attendees were reminded of the format at the beginning of the meeting. The informal question-and-answer session was designed to provide immediate responses to the public's questions and concerns. Several questions were answered during the informal period of the public meetings on the Proposed Plan. This Responsiveness Summary does not attempt to summarize or respond to issues and concerns raised during the informal part of the public meetings. However, the Administrative Record contains complete transcripts of these meetings, which include the agencies' responses to these informal questions.

Comments received during the formal comment session of the meetings and written comments received during the public comment period are addressed by the agencies in this Responsiveness Summary. The public was requested to provide their comments in writing, orally during the public meetings, or by recording a message using INEEL's toll-free number. The comments below are printed in their entirety and were not summarized. The only edits made were to correct minor spelling and editorial errors. In those cases where written comments were received that were difficult to read, a best attempt to interpret the comment is provided. Copies of the originally written comments are provided in the Administrative Record file for NRF.

Comment 1

Agree that Alternative 3 is the best option.

Response: The agencies appreciate the time and effort made to read and comment on the Proposed Plan.

Comment 2

The proposed "Alternative 3: Limited Excavation, Disposal, and Containment" for Waste Area Group 8 - Naval Reactors Facility needs to be modified to better protect the groundwater, reduce costs, and reduce health risks to construction workers. The contaminated soils should be left in place and capped with capillary barriers. The capillary barrier will result in reduced health risk, reduced costs, and improved groundwater protection. There is an ongoing effort at the INEEL as well as the Hanford Area and Sandia National Laboratories to design capillary barriers that greatly reduce the movement of water through buried waste and thereby minimize contaminant transport. As a steward of the environment, the INEEL needs to minimize the leaching and contaminant transport at all sites, within reasonable economic constraints.

Response: The riprap cover shown in the Proposed Plan for Alternative 3 was only a preliminary design consideration and will be more fully evaluated during the remedial design phase. To eliminate any additional confusion about the cover design, the figure shown in the Proposed Plan was eliminated from the ROD text. The design of the covers for Alternative 3 at the consolidated areas will include an evaluation of contaminant migration and the value of capillary barriers, although sampling performed during the NRF Comprehensive Remedial Investigation (RI) showed very little migration of contaminants of concern from the discharge point (i.e., pipe, concrete basin).

Leaving the soil in place at all sites and constructing caps over each site was not considered a feasible option. Some sites are below a concrete basin (NRF-17) or asphalt roadway (NRF-12A

and NRF-80). Portions of three sites (NRF-11, NRF-12A, and NRF-21A) exist in the subsurface between the NRF security fences, which makes covering in place not possible. In addition, some of the sites involve underground piping. Covering the entire length of the pipe was not considered feasible and could permanently disrupt the use of site areas.

Comment 3

The excavation and capping with riprap proposed under Alternative 3 is not a good alternative. The excavation process is not a simple process in itself and the details are important. Several details that come to mind include: (1) The cleanup level is specified as a concentration for each species in pCi/g, is the number a mean over the whole area? Or is it the maximum concentration on the remaining solids? (2) During excavation and transport of the contaminated soils how will spills and over filling of trucks be handled? (3) What dust suppression method will be used? (4) Moving soil is a very dirty operation and even though dust is controllable there is always dirt. The risk analysis presented in the Public Meetings/Briefings brochure dated January 1998 is not complete. I could not find any mention of the risk to construction workers arising from physical activities. This risk estimate needs to include the physical risk as well as the inhalation, ingestion, and physical contact exposure effects. Thus, the total risk of the alternatives appears to not have been assessed. I realize this meeting was not put together to deal with this level of detail, but the moving of contaminated soil at the INEEL will cost time and cost money. Any idea that does not require moving contaminated soils should be moved up the list of preferred alternatives.

Response:

(1) The cleanup levels established in the Proposed Plan correspond to maximum allowable values for each confirmatory sample. Any material above these values will be removed.

(2) The work will be engineered with detailed work, safety, and training procedures to minimize the potential for spills and to prevent overfilling trucks during excavation work. Many of these procedures are currently in place and workers are continuously trained on proper radiological controls, including spill response situations.

(3) The excavation of contaminated soil has been successfully performed during past remedial work. Also, NRF gained experience in dust suppression during the prior construction of three landfill covers at NRF. Possible dust suppression techniques include keeping the soil wetted during excavation activities, performing excavation in tented enclosures, halting excavation work during windy conditions, and keeping man-made covers over contaminated soils. All these techniques will be evaluated when planning the work addressed by this ROD.

(4) The comparison of alternatives required a qualitative evaluation of risk to workers and the public during remedial activities. A quantitative, or numeric, risk assessment for the workers performing the remedial actions is outside the scope of the NRF Comprehensive RI/FS. Exposure limits are established that workers cannot exceed and exposure is monitored. Long standing, proven Naval Nuclear Propulsion Program radiation and contamination controls will be applied to this work.

Regarding physical (e.g., construction safety-related) work risk, NRF requires many safety provisions in work procedures and requires following applicable Occupational Safety and Health Act requirements. However, as stated above, a quantitative risk assessment in this regard is outside the scope of the RI/FS. The quantitative risk assessments performed during the RI/FS are intended to show the risks associated with a site in the absence of any remedial action, which in turn will provide the basis for determining whether or not a remedial action is necessary and the justification for performing specific remedial actions. The chosen Alternative 3 appears

to minimize the movement of contaminated soils, which in turn will minimize physical work-related risks.

Comment 4

Actual performance of the riprap for controlling biologic processes over time has not been demonstrated. The riprap covers in place on the INEEL do not appear to me to be effective in control of small mammals. In fact riprap appears to be excellent habitat for pack rats, mice, and rock chucks. They provide high elevations for the rock chucks to sun themselves, the network of large voids serve as ready made burrows, and as a whole appear to be excellent protection from predators. The riprap will trap snow and further increase infiltration of water. Also, the riprap will reduce water losses from evaporation and evapotranspiration processes and thereby increase the total volume of water available for the leaching of contaminants. The overall effect of Alternative 3 will be to increase leaching rates and long term contaminant transport to the Snake River Plain Aquifer. The fact that Alternative 3 may meet regulations of today is no indication that the design will meet future regulations. Future regulations will include monitoring above the aquifer, at which time the rapid infiltration and possibility of contaminant transport will become front-page news.

Response: The cover design shown in the Proposed Plan was only a preliminary design consideration, and all comments received on the cover design will be considered during the design evaluation. It should be noted that migration of contaminants of concern to the aquifer is not considered likely because the contaminants of concern tend to adsorb to site soils, and because the low precipitation in this area provides only minimal driving head to move contaminants deeper into soils. The sites of concern were typically pond or leaching areas that received large quantities effluent, yet sampling has shown that the contaminants of concern are still primarily retained in the soil within a few feet from the discharge point. The entrapment of future precipitation would not likely alter this condition.

Comment 5

One way to further reduce risk is to minimize the construction effort. Since the capillary barriers can be constructed using gravels and soils that are close to the actual site the efforts of construction and overall cost will be reduced. I recommend that the contaminated soils be left undisturbed and that capillary barriers be added to the land surface, to control health risks associated with removal, transport, and repositioning of contaminated soils.

I want the capillary barriers to be considered as an Alternative Action and see the comparison to the alternatives presented in the Proposed Plan for Waste Area Group 8 - Naval Reactors Facility. I also want to see the risk to construction workers accounted for in the risk assessments of the alternatives.

Response: The agencies agree that minimizing construction efforts in general reduces short-term risks. That is one reason the limited excavation alternative (Alternative 3) was selected over the complete excavation alternative (Alternative 4). However, as stated in the response to Comment 2, several sites are located in areas where a cover is not practical. Capillary barriers will be considered as part of the covers during the design phase. Health risks during construction activities were discussed in Comment 3 above.

Comment 6

The Environmental Defense Institute (EDI) received the Department of Energy (DOE) proposed plan (Plan) on Friday January 16th. Since Monday was a national holiday, it meant that EDI received the Plan one working day prior to the public meeting in Moscow Wednesday

January 21. The public meetings are the only opportunity an individual has to get oral testimony into the public record. Inadequate preparation time literally translates into inadequate opportunity to be engaged in the decision making process. Additionally, there are two comprehensive waste area group plans presented, one for the Naval Reactors Facility and one for Argonne National Laboratory - West, covering a total of over 28 individual waste release sites. The volume of information needed to review two comprehensive plans is orders of magnitude over one or two subgroup (operable unit) waste release sites. Therefore, the public participation process is fatally flawed and unacceptable. EDI appreciates that the agencies responded to our preliminary comments by extending the comment period.

Response: As stated in the comment, the public comment period was extended for 30 days to allow additional time for public review and comment on the Proposed Plan.

Comment 7

The apparent absence of lessons learned between the Hanford Environmental Restoration (ER) process and the INEEL ER process is regrettable and a serious threat to Idaho. DOE is taking advantage of its position as the single largest employer in Idaho to float ER actions at INEEL that it was not allowed to do at Hanford because public and regulatory pressure blocked shortcuts. Specifically, at Hanford DOE was required to build the Environmental Restoration Disposal Facility (ERDF) which is a fully compliant Resource Conservation Recovery Act (RCRA)/Nuclear Regulatory Commission (NRC) mixed hazardous/radioactive dump with double liner, leachate collection and monitoring wells and an impermeable cap. ERDF was completed in the Spring of 1996 at the farthest location on Hanford away from the Columbia River and will receive contaminated soil and decontamination/decommissioning (D&D) waste. At INEEL, DOE refuses to build such a repository because the Department is not being pressured by the state and EPA regulators to comply with the law.

Response: Sampling performed at NRF has not shown any RCRA characteristic waste in the soil. If any RCRA characteristic waste is encountered while excavating, the applicable RCRA regulations will be met. Disposal will be accomplished per the applicable or relevant and appropriate requirements (ARARs) given in the Record of Decision. NRF has always complied with applicable regulations and will continue to do so in the future.

Comment 8

The Plan (January 1998 publication) assumes that the DOE and the Naval Reactors Facility (NRF) enjoy credibility in the public's eye. This is an invalid assumption. These agencies have broken the law and are being forced via a Federal Facility Agreement and Consent Order to correct their illegal activities. As illegal polluters, no credibility can be assumed and therefore full and complete disclosure is demanded in all Plan publications. The Plan does not provide the reader with full disclosure or provide the essential information the reader needs in order to evaluate the appropriateness of the preferred remedial alternative. For instance, maximum contaminate levels for all contaminates of concern must be stated for each Operational Unit as well as the effective standard for that contaminate so that the reader can make up their own mind whether the cleanup actions or no actions are appropriate. Stating conclusions without providing definitive data to support the finding assumes credibility that the agencies do not have.

Response: Maximum soil concentrations detected at OU 8-08 during RI/FS or pre-RI/FS sampling were provided in Table 2 of the Proposed Plan. The Proposed Plan is a summary of the Comprehensive RI/FS performed at NRF. As stated in the plan, supporting documents are available at Information Repositories at various locations identified in the Plan. The supporting documents contain much more detailed information on the investigations performed at NRF,

including sample results. As previously stated in the response to Comment 7, NRF has always complied with applicable regulations and will continue to do so in the future.

Comment 9

Another major assumption that is extensively evoked in the Plan is 100 years of DOE monitoring and institutional control of the contaminated sites. In real life, when entities break the law, and are required to do major corrective actions in the future, they are generally required to establish a trust fund so that if they again decide to disregard their legal requirements, or are no longer in existence, the funding will be there for the state or local government to do the job. The state of Idaho should therefore, require DOE to establish a monitoring/institutional control trust fund to cover those costs at INEEL. An example of where this issue is important is the current designation that NRF is not in the Big Lost River (one mile away) 100 year flood plain. This current designation is due to Big Lost River dams that divert flood waters south into spreading areas. These dams and their related water channels require regular maintenance in order to provide that flood protection to NRF and other INEEL facilities. Spring 1997 runoff nearly topped the dams. Prior to construction of the diversion dam, NRF was in the Big Lost River 100 year flood plain[RI/FS@5]. Nuclear Regulatory Commission (NRC) radioactive waste disposal requirements state, "waste disposal shall not take place in a 100 year flood plain."[10CFR § 61.50] Stipulated institutional control in the Record of Decision must include diversion dam and water channel maintenance as well as an explicit monitoring regime and maintained fencing of waste sites. The NRF Plan proposes consolidation of contaminated soil into one of the leach pits. The cesium alone will take over 420 years to decay to acceptable risk levels, or considerably longer than the planned 100 year institutional control. Indeed, institutional control must extend as long as the contaminates are hazardous.

Response: (1) Trust funds are not applicable to the Federal Government. (2) NRF is not located on the 100-year flood plain (even in the absence of the dam), although parts of the INEEL are on the flood plain. Nevertheless, the scenarios evaluated for the human health risk assessment conservatively included flood-type conditions even though flood-type conditions are very unlikely at NRF. (3) The monitoring and institutional controls are an integral part of the selected remedial action. CERCLA requires that a review be conducted every five years when contaminants are left onsite above risk-based levels to ensure the selected remedy remains protective of human health and the environment. This continues after the 100-year period, which refers to the earliest reasonable time that residential use could be envisioned for any portion of the NRF site. The remedial action does not allow an entity to "walk away" from the sites of concern. Institutional controls are established such that fencing, border markers, and legal land use restrictions will control access to the sites even if a DOE presence is no longer established at the site. The design of the engineered cover will include a design criterion that the integrity of the cover remains protective for as long as the radionuclides are present above risk-based concentrations, which, based on the highest cesium-137 detected during remedial investigation sampling (7,323 pCi/g), would be approximately 365 years.

Comment 10

The Environmental Protection Agency (EPA) and the Idaho Division of Environmental Quality (DEQ) also incorrectly assume credibility with the public. The presence of their logos on the Plan, their review of the document, and their endorsement of the preferred alternative make these agencies complicitous in the Plan's inadequacies and flaws as well as a history of INEEL "cleanup" Plans that were more coverup than cleanup.

Response: EPA and DEQ have reviewed the Proposed Plan and have determined that it adequately describes all essential elements of a Proposed Plan including site characteristics, the nature and extent of contamination, site risks, remedial action objectives, description of

remedial alternatives, and comparative analysis of alternatives. The presence of the agencies' logos on the Proposed Plan does not mean that the agencies have selected a remedy for NRF. The agencies will consider public comments received on the Proposed Plan prior to selecting a final remedy in the Record of Decision.

Comment 11

The Plan states: "The Comprehensive RI/FS Waste Area Group 8 represents the last extensive Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) investigation for the Naval Reactors Facility." This Plan is not "comprehensive" because it excludes the Retention Basin (one of the most contaminated waste sites at NRF) from the CERCLA cleanup process. The Retention Basin (OU-8-08-17) is a large concrete tank that temporarily holds liquid radioactive and chemical wastes (presumably to allow short-lived isotopes to burn off) prior to discharge to the various leach pits. The Plan fails to state that the sludge in the basin contains cesium-137 at 192,700 pico curies per gram (pCi/g)(risk-based action level is 16.7 pCi/g) and Cobalt-60 at 20,410 pCi/g.[RI/FS@H8-8] A long history of Basin leaks assures significant soil contamination under the basin and therefore must be included in the Comprehensive Plan.

Response: The retention basins were included in the Proposed Plan (e.g., see pages 9 and 10) with a remedial action that includes removing the concrete basins and cleaning up that soil below the basins which contains radioactivity above remediation goals. The sludge in the basin will be removed under decontamination and dispositioning activities at NRF. The basins and underlying soil will be remediated under CERCLA actions. The cesium-137 and cobalt-60 radioactivity results stated in the comment are from the sludge contained in the basins and do not accurately represent the potential radioactivity in the soil. The basins are known to have leaked on only one occasion (33,000 gallons in 1971). Although other leaks may have occurred and gone undetected, they would have been small compared to the 1971 leak. The sludge in the basins is an accumulation of several years of particulate matter, there is no reason to believe that the radioactivity concentrations in the soil would be equal to the radioactivity in the sludge. Although the sludge sample data are not used in risk calculations, they do help to identify potential contaminants of concern that may be present in the soil.

Comment 12

The Plan's exclusion of the NRF Expended Core Facility (ECF) contaminated soil resulting from leaks additionally demonstrates the incompleteness of the so called "comprehensive" Plan. The ECF, built in 1958, does not meet current spent reactor fuel storage standards that require stainless steel liner, leak containment, and leak detection systems. The ECF should be shutdown for exactly the same reasons the Idaho Chemical Processing Plant (CPP-603) Underwater Fuel Storage Facility and the Test Area North Pool were shut down - they are an unacceptable hazard and do not meet current standards. ECF has been leaking significantly over the past decade and the soil contamination around and underneath the basins must be included in the CERCLA cleanup process.[RI/FS@5-1] The Plan offers no soil sampling data to substantiate exclusion of the ECF from CERCLA action. A theoretical risk analysis assumed only one leak (>62,500 gallons) which does not reflect the actual ECF history and that is why the sampling data is essential.

Response: There has been only one known leak from the ECF water pits, which was evaluated in the NRF Comprehensive RI/FS. The most significant pathway due to an ECF leak would be via groundwater. The risk assessment in the RI/FS used a very conservative assumption that the entire volume of water immediately migrated to the aquifer without dilution and was available for consumption. Even with this very conservative assumption, risks were not above the National Contingency Plan (NCP) target risk range. The operational aspects of ECF

with respect to accident analysis, earthquake scenarios, structural integrity, etc., have been evaluated and documented in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement*. The Environmental Impact Statement concluded that present and future ECF operations have very small adverse environmental impact. In addition, this facility will continue to be operated in accordance with all applicable regulations and standards.

Comment 13

The Plan's exclusion of the Sewage Lagoon (NRF-23) from its so called "comprehensive" CERCLA cleanup, again, demonstrates the incompleteness of the Plan. Contaminate levels of arsenic, mercury, and cesium-137 would normally require remedial action. In fact, the Track 1 investigations recommended inclusion of the lagoons into the comprehensive RI/FS primarily due to radionuclides and the risk assessment results showed increased cancer rate of 1 in 10,000 from exposure to the site.[Plan@25] The Plan offers no data to substantiate the "risk management decision" to exclude the lagoons. NRF intends to continue to use these unlined leach pits despite the fact that every gallon of waste water that flows into the pit, leaches more of the contaminates toward the aquifer below. NRF should be required to close the Sewage Lagoons, clean them up, and build new lined ponds that meet current regulations. U.S. Geological Survey NRF well sample data confirm ground water inorganic contamination three orders of magnitude over the Maximum Contaminate Levels (MCL).[DOE/ID-22125@45] Clearly, the failed waste management practices of the past must end immediately.

Response: The sewage lagoons were evaluated as part of the NRF Comprehensive RI/FS. Arsenic and mercury were eliminated as contaminants of concern based upon risk management decisions that are detailed in Section 20 of the NRF Comprehensive RI/FS. In fact, the concentrations of arsenic and mercury at the sewage lagoons are below the allowable concentrations of these contaminants for direct land application of the sewage sludge to agricultural, forest, and home lawn lands (EPA 822/R-93-001a – Technical Support Document for Land Application of Sewage Sludge, November 1992). Discharges to the lagoons remain in compliance with existing regulations.

The data used to assess the presence of radionuclides in the lagoons were from the 1994-95 Environmental Monitoring Program. This data is the most reliable data available.

The sewage lagoons are clay lined. The clay liner acts to trap constituents present in the sewage effluent. A hydrogeologic study was performed for the NRF Comprehensive RI/FS and conservative assumptions were made during the study. The clay liner was assumed to leak, making all contaminants present in the sludge available for migration. Even with this conservative assumption, risks from the groundwater pathway were acceptable.

The 1 in 10,000 (1E-04) chance of increased cancer represents a very conservative estimate of the cancer risk associated with chemical and radiological constituents present in the sewage lagoon. There are uncertainties associated with the calculated risk. For instance, adding the increased cancer risk from a chemical constituent, such as arsenic, to an increased risk from a radiological constituent, such as cesium-137, likely overestimates the risk since each constituent affects humans differently. For this and other reasons, regulatory agencies have not historically attempted to sum chemical and radiological risks. In any event, the 1E-04 increased risk falls within the allowable risk range established by the NCP and, considering the conservative assumptions used in the risk assessment, a decision was made by the agencies that the risk present at the sewage lagoons is acceptable. The sewage lagoons have been delineated as a No Further Action site, which requires the decision to be reviewed every five

years to ensure this decision remains effective. This review will include newly acquired data from sampling performed at the lagoons and groundwater sampling.

Wells at NRF have exceeded secondary MCLs for iron. Secondary MCLs are non-mandatory guidelines that are intended to control the aesthetic quality of drinking water. As discussed in the hydrogeologic study in the RI/FS, the iron concentrations are highly variable. For example, the concentration of iron in a USGS well upgradient of NRF varies from 10 parts per billion (ppb) to 3,000 ppb, which is ten times the secondary MCLs. This phenomenon is observed often across the INEEL. A review of INEEL groundwater data for iron in conjunction with research associated with the NRF Land Application Permit indicates that the presence of iron is related to the unfiltered nature of the samples, the iron being contained in the naturally occurring sediment extracted during the pumping of well water. The amount of sediment observed from well samples is a property of well construction and geology, and does not appear to be related to their proximity to NRF facilities.

Comment 14

The preferred alternative 3 that DOE, the State, and EPA want the public to accept cannot be justifiably called a cleanup plan. A shell coverup game, yes, but not a cleanup plan. Alternative 3 is a rerun of the misguided actions at the INEEL Test Reactor Area Warm Waste Pond. The NRF Plan calls for the consolidation of the contaminated soil from numerous sites into the bottom of one of the old leach pits (S1W Leach Pit), then cap it with rocks and gravel. It's quick, dirty and comparatively cheap; and that's why DOE likes it. With a slight of hand DOE wants to create a dump without calling it a dump because if they called it a dump then they would have to comply with hazardous and radioactive disposal regulations. If it looks like a duck, walks like a duck, and quacks like a duck then it is a duck. The very moment contaminated soil is moved from one site to another, a dump is created, and therefore, the regulations apply regardless what DOE wants to call it.

Response: Consolidation of contaminated soil at NRF (Alternative 3) was compared to various alternatives for soil disposal including complete excavation and disposal at facilities away from NRF (Alternative 4). Consolidation of soil at NRF rated favorably when compared to the complete excavation option (Alternative 4) for short-term effectiveness (more protective of workers during remedial actions), implementability (much less soil to excavate, package, and transport), and cost (estimated at $10 million dollars less). Alternatives 3 and 4 rated equivalent in overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). It is important to note that consolidation of soil at NRF will meet all ARARs. None of the excavated soil is expected to be hazardous. Also, strictly speaking, consolidation of existing contamination as part of a CERCLA remedial action does not constitute formation of a "dump."

Comment 15

The Plan offers inaccurate data to support the preferred alternative. The Plan states that the maximum soil concentration at all of the 8-08 Operable Units for cesium-137 is 7,323 $pCi/g_{[Plan@14]}$. Appendix H of the RI/FS however credits the S1W Leach Pit with a maximum detected cesium-137 concentration of 149,759 pCi/g "decay corrected to obtain equivalent 1995 results." $_{[RI/FS@H4-22]}$ This contaminate concentration discrepancy is significant because the undisclosed higher amount qualifies under NRC radioactive waste Class B criteria in 10CFR § 61.55 and the "technical requirements for land disposal facilities," in § 61.50. The preferred alternative does not meet NRC requirements. Actually, DOE's preferred alternative does not even meet municipal garbage landfill requirements under RCRA Subtitle D which require liner, leachate monitoring wells, impermeable cap, and location restrictions over sole source aquifers. The NRF Plan contains none of these essential features. This Plan effectively shifts the risks,

hazards, and ultimate cleanup costs to future generations. The high levels of hazardous materials in the NRF waste qualify it as a mixed hazardous and radioactive waste under the 1992 Federal Facility Compliance and RCRA Land Disposal Restrictions. Hazardous contaminates in the soil include chromium at 2,090 mg/kg, lead at 1,140 mg/kg and mercury at 56.1 mg/kg. EPA's interim lead soil cleanup level is 400 mg/kg. The Plan offers no Toxic Concentration Leach Procedure (TCLP) data to support exclusion of this hazardous waste from regulatory disposal compliance. The transuranic contaminates (americium-241 and plutonium-238) at 20 pCi/g have half-lives of 432 and 87 years respectively guarantee the waste will be hazardous for a long time. Under the circumstances, it is difficult to see how the Plan's preferred alternative can claim to meet all the "Applicable or Relevant and Appropriate Requirements" (ARAR).

Response: The cesium-137 concentration of 149,759 pCi/g identified in the comment was detected at NRF-12B (S1W Leaching Pit) in 1972. As stated in the RI/FS Work Plan, this concentration was suspected to be a particle and not representative of actual soil concentrations; 69 other samples collected from the area between 1972 and 1978 showed a maximum cesium-137 activity of 2,600 pCi/g (decay corrected to 1,759 pCi/g in 1995) and a second highest value of 620 pCi/g (decay corrected to 410 pCi/g in 1995). The sampling performed in the 1970's was used to determine contaminants of potential concern, but was not used for risk assessment calculations. Data collected between 1990 and 1996 were used for the risk assessment.

Further, the comment states that the 149,759 pCi/g would qualify the soil as NRC radioactive waste Class B as defined in 10CFR § 61.55. This is incorrect. Even if the 149,759 pCi/g were representative of the soil contamination, and even if no credit were taken for radioactive decay since 1972, the contaminated soil would still fall below Class A criteria, which the proposed cover will meet. (It is also appropriate to note that meeting Class A criteria is not a requirement for CERCLA actions.)

None of the contaminated soil at the nine sites of concern is expected to be RCRA hazardous. The Proposed Plan, which is a summary document of proposed remedial action alternatives, did not include all past sample results; however, none of the soil at NRF has been shown to be RCRA hazardous. The concentrations of metals cited in the comment are total metal results and do not represent TCLP results. Past TCLP sample results from areas with the highest metal concentrations did not show levels above RCRA limits. (TCLP sample results were presented in the NRF Comprehensive RI/FS Work Plan.) Therefore, no hazardous or mixed waste is expected to be generated during remedial actions.

The sample result showing 20 pCi/g of americium-241 and plutonium-238 did not distinguish between the two radionuclides. A conservative approach was taken that considered both americium-241 and plutonium-238 to be present at a maximum concentration of 20 pCi/g. As shown in the Proposed Plan, the 20 pCi/g for either americum-241 or plutonium-238 is still well below the risk-based concentration representing an increased cancer risk of 1E-04. The lowest risk-based concentration was 283 pCi/g for americium-241 and 590 pCi/g for plutonium-238 through the soil ingestion pathway. Americium-241 at 20 pCi/g represents an increased risk to a future resident through all exposure pathways of 2E-05. Plutonium-238 at 20 pCi/g represents an increased risk to a future resident through all exposure pathways of 5E-06. These risks fall within the target risk range as defined in the NCP.

Comment 16

The INEEL Oversight Program's Kathleen Trever claims that the S1W data set containing the 149,759 pCi/g cesium-137 was not considered reliable by DOE and therefore it was not used in the Risk Assessment. When asked about this data-set discrepancy, EPA's Wayne Pierre said

that DOE could not arbitrarily ignore a data-set unless they had more than 10 data-sets, and then they could choose the most reliable 10 sets. Since DOE only had three data-sets, Pierre thought it unacceptable to rely completely on the 1991 and 1992 samples. It is possible that the earlier sampling grid identified hot spots that the later sampling grids could be planned to avoid.

Response: The cesium-137 activity of 149,759 pCi/g that was detected in one of 70 samples collected between 1972 and 1978 from the S1W Leaching Pit area was not ignored. Each site's maximum concentration was used throughout the initial evaluation to identify potential contaminants of concern in the RI/FS work plan for that site, even though average concentrations would have shown a more likely contaminant concentration at each site. The average concentration for data collected at the S1W Leaching Pit between 1972 and 1978 was less than 3,000 pCi/g when including the single 149,759 pCi/g sample, or near 100 pCi/g when not including the 149,759 pCi/g sample. Sample data collected in the 1970's did not have the appropriate data quality (e.g., no quality control samples were run, or exact sample location is unknown) to allow its use in risk assessment calculations, and therefore data collected from recent sampling events as described in the RI/FS Work Plan were used for risk assessments. For the S1W Leaching Pit, a concentration term of 2,040 pCi/g for cesium-137 was used, which was the highest detected cesium-137 activity from either the S1W Leaching Pit or the adjacent S1W Leaching Beds during recent sampling. This was very conservative, relative to using the 95% upper confidence limit of the mean concentration, which would have been more realistic.

EPA does not provide guidance concerning the number of data sets necessary for risk assessment. EPA does provide information recommending the use of at least ten data points when calculating a mean and 95% upper confidence limit used for establishing a reasonable maximum exposure (RME) level for risk assessment (EPA/540/1-89/002, Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A)). When there are fewer than ten data points in a data set, EPA recommends to use the maximum value of the data set. Although most data sets consisted of more than ten samples, NRF conservatively elected, in most cases, to use the maximum value found at each site when performing the individual site risk assessments.

Finally, later sampling did not avoid the location of the 1972 highest level sample. Rather, sampling has been performed all around this area, but the levels found were much less than the highest 1972 level found.

Comment 17

1971 sampling data buried in the RI/FS show long-term waste mismanagement at the S1W Leach Pit with cesium-137 at 310,000 pCi/g, cesium-134 at 4,200 pCi/g, hafnium-181 at 20,000 pCi/g, and cobalt-60 at 1,300,000 pCi/g.[RI/FS@I-59] Algae (accessible to ducks using the pond) sampling shows 667,447 pCi/g.[RI/FS@pg H8-13] By comparison, the risk based soil concentration for cesium-137 applied to this Plan is 16.7 pCi/g. These high contamination levels were due primarily to once through reactor cooling water dumped in the leach pits which was discontinued by 1980. No explanation is offered why the remediation goal applied to Waste Area Group 3 of 0.02 pCi/g for cesium-137 was changed.

Response: As stated in the RI/FS Work Plan, the 1971 samples were collected from the mud of the active S1W Leaching Beds. The location and circumstances of the sample collection were not recorded. The contaminants detected during historic sampling were only used to determine potential contaminants of concern, not risk; historic sampling does not represent current conditions of the leaching bed soil. Recent sampling evolutions better represent site conditions.

The comment also states that a remediation goal of 0.02 pCi/g for cesium-137 was used at Waste Area Group (WAG) 3. WAG 3 does not have a remediation goal of 0.02 pCi/g for cesium-137, but did use that as a screening level for considering cesium-137 as a potential contaminant of concern. WAG 3 cleanup goals are similar to WAG 8 (NRF) cleanup goals.

Comment 18

Alternative 4, Complete Excavation and "Off-site Disposal" is equally unacceptable because "Off-site" is defined as hauling the contaminated soil from NRF to another INEEL leach pit consolidation site at the Idaho Chemical Processing Plant, Test Reactor Area, or the Radioactive Waste Management Complex, none of which would qualify even as a garbage dump. Interestingly, DOE calls these "INEEL soil repositories." Therefore, alternative 4 does not meet legal requirements in the ARAR's.

Response: Alternative 4 would meet the legal requirements in the ARARs. Off-site, as defined in Alternative 4, means: (1) disposal to a potential soil repository at the Idaho Nuclear Technology and Engineering Center (INTEC) (formerly the Idaho Chemical Processing Plant (ICPP)) that would be established through a public input process; (2) disposal to the warm waste pond at the Test Reactor Area that is currently being used for soil consolidation of other CERCLA sites; (3) disposal to the Radioactive Waste Management Complex that currently accepts low-level radioactive waste; or (4) disposal away from the INEEL to a location licensed to receive the soil and debris from NRF.

Comment 19

The cumulative risk assumptions that determine the exposures to future 100 year residential and occupational scenarios are not conservative (most protective of human health) and not supportable. The Plan states: "The ingestion of soil, the ingestion of food crop, and direct contact with soil through the dermal pathway are not included in the cumulative assessment because these involve exposures routes that are not likely to occur at more than one release site at a time." [Plan@11] A possible future scenario of a pasture over the leach pit, a well over the Retention Basin, and dermal exposure from digging around the ECF is reasonable. Therefore, all these pathways must be considered to be cumulative. The risk assessment must also be recalculated using the above cited maximum cesium-137 contaminate level of 149,759 pCi/g which will produce radically different results from the 7,323 pCi/g used by DOE as the maximum contaminate level at NRF.

Response: The purpose of the cumulative risk assessment was not to add worst case risks from various pathways across many sites (i.e., soil ingestion risk from one site added to groundwater ingestion risk at another site). The cumulative risk assessment evaluated the additive effects of several sites for each cumulative pathway of concern (i.e., dust from one site intermingles with dust from another site causing an accumulation or higher contaminant concentration in the dust). The ingestion of soil, the ingestion of food crop, and direct contact with soil through the dermal pathway are not considered cumulative because the worst case scenario for these exposure pathways would be a person residing directly at the site in question. The individual site risk assessments calculated the worst case scenario risks for these pathways. Risks via these pathways cannot be any higher through accumulation than the risk calculated for the individual site with the highest contamination. As an example, a person eating the maximum expected quantity of site-grown food, all from within the most contaminated area, cannot also be expected to eat food grown in a less contaminated area. If an individual were to ingest a mixture of plant material grown at two sites (one with the highest contamination and one with less), the cumulative effect (risk) to that individual would be less than ingesting all plant food from the site with the highest contamination. This illustrates why ingestion of soil, ingestion of food crop, and direct dermal contact are not considered cumulative across different sites.

However, the inhalation of dust, groundwater ingestion, and direct exposure to radionuclide pathways are spatially cumulative. A receptor located at one site breathes air containing particulates which may have come from multiple sites. In the case of groundwater ingestion, it is not possible to determine the location of a hypothetical future well. It must be assumed that a well could be in a location in which it would receive contamination from multiple sites. The direct exposure to radionuclides may also be additive if a receptor is located between two sites and receives exposure from both sites.

The cesium-137 activity used for risk assessments was explained in the response to comment #15. Regardless of the cesium-137 activity used for the risk assessment, the results would be the same: based upon either 7,323 pCi/g or 149,759 pCi/g, an unacceptable risk would be present that requires some type of remedial action. The 16.7 pCi/g remediation goal for cesium-137 was established to prevent effects from any amount of cesium-137 above this level. Its selection is independent of the cesium-137 levels at each site.

Comment 20

NRF and DOE representatives stated at a public meeting in Moscow that the groundwater and aquifer are not at risk because contaminates are absorbed by the soil column. Review of the historical deep well sampling data at NRF does not support the Navy's conclusion. The NRF October 1995 Remedial Investigation/Feasibility Study (RI/FS) Appendix K shows Table III Deep Well Sample Results for Wells #1, #2, and #3 at 60, 69, and 44 pico Curies per liter respectively for gross beta. The federal drinking water standard (MCL) for gross beta is 8 pico curies per liter. This deep well sample data confirm that the contaminates do migrate, contrary to the Navy's claims. The USGS well sample data previously cited additionally confirm contaminate migration.

Response: The data from groundwater wells in October 1976 were described in the 1976 Environmental Monitoring Report as being an abnormality. The laboratory performing the analysis confirmed that all INEEL wells showed elevated beta activity levels above minimum detectable levels. The laboratory concluded that the likely cause was cross-contamination at the laboratory and not contamination of well water. This is supported by the data collected during the months prior to and after the October data.

In any event, for risk calculation purposes, some absorption by the soil column is considered. The absorption is a property of the soil matrix and chemical being absorbed. No chemical was assumed to be completely absorbed.

Comment 21

The Plan's "remediation goals" that set risk-based soil concentrations for contaminates of concern (cleanup goals) fail to include inhalation as an exposure pathway. This exclusion represents a major flaw in the Plan. Inhalation is the most biologically hazardous for alpha emitting contaminates of concern listed as americium-241, neptunium-237, plutonium-238, plutonium-244, and uranium-235, yet inhalation is not considered for these isotopes, nor for lead. The wide difference between ingestion of beta/gamma contaminated soil also appears out of balance. For instance cleanup goals for cesium-137 external exposure is set at 16.7 pico curies per gram (pCi/g) while ingestion of soil is set at 24,860 pCi/g. Additionally, the beta emitter strontium-90 is not considered for external or inhalation exposure but is considered for soil ingestion at 15,416 pCi/g and food crop ingestion at 45 pCi/g.

Response: The inhalation exposure pathway was evaluated in the risk assessment presented in the NRF Comprehensive RI/FS, which was the primary referenced document of the Proposed

Plan. The inhalation pathway did not show an increased cancer risk greater than 1E-06 for any of the contaminants of concern. It was therefore not necessary to calculate a risk-based cleanup target concentration for any contaminants through this pathway. Although inhalation of alpha-emitting radionuclides was a concern and was evaluated during the risk assessment, the soil concentration would have to be relatively high in order for enough alpha-emitting radionuclides to become airborne and become a risk driver. The same logic applies to the inhalation pathway for other contaminants.

The wide variability in acceptable concentrations of radionuclides, depending on both radionuclide and pathway, is based on how they can affect people. Radionuclides that emit gamma radioactivity can cause a larger direct exposure dose than those that only emit beta or alpha types of radioactivity (which do not penetrate more than a few inches of air); hence a relatively low cleanup concentration for gamma emitters may be required to keep direct exposure doses low, whereas much higher concentrations of non-gamma emitters (e.g., beta or alpha only) may be acceptable since the doses they can give people are much less. For cesium-137, the relatively high risk-based concentration through the soil ingestion pathway compared to the external exposure pathway is a result of the limited bioaccumulation of cesium-137 in human tissue during the ingestion process. In other words, a large percentage of cesium-137 passes through the body, limiting exposure to the radionuclide. The external exposure pathway assessment assumes a constant source of gamma emitting radioactivity being present in the soil and assumes the receptor is exposed to the source continually throughout the exposure duration period, which is more conservative than the assumptions in some standard computer programs modeling exposures.

Similarly, some radionuclides such as strontium-90, due to their chemical nature, may be readily taken up into the food chain, which would result in the need for lower concentrations as cleanup goals for this pathway (to keep the doses low). Other chemicals such as cobalt (and hence any cobalt radionuclides like cobalt-60) may not be readily taken up by plants, and hence even high concentrations would still be of low risk for this pathway.

The RI/FS essentially picks the lowest acceptable concentration for each radionuclide, from among the various pathways, and uses that for the risk-based cleanup goal for that radionuclide.

Comment 22

An integral factor in the Plan's establishing a "remediation goal" is the maximum concentration of contaminates of concern. The Plan acknowledges (pg 14) that the maximum cesium-137 soil contamination detected at the NRF is 7,323 pCi/g which generated a risk based cleanup goal of 16.7 pCi/g. Again, as previously discussed, this must be recalculated using the above cited maximum detected cesium-137 at 149,759 pCi/g "decay corrected to obtain equivalent 1995 results." This significant discrepancy begs the question as to the quality of regulatory review the State and EPA are bringing to the process and whether the "remediation goals" are supportable.

Response: The remediation goals are based on risk levels associated with specific post-remediation concentration limits. The goals are not related to any specific sample results. Regardless of the activity of cesium-137 used for the existing site-specific risk assessments, the remediation goal of 16.7 pCi/g would not change. The 16.7 pCi/g represents a current present-day activity level which corresponds to an increased risk of cancer of 1 in 10,000 for a future 100-year resident via the external exposure pathway, which is the exposure route of concern. Hence, areas below 16.7 pCi/g cesium-137 at the present time would be acceptable for unrestricted release in 100 years.

Comment 23

These comments actually apply to both the proposed plans for WAGs 8 and 9, but especially WAG 8 since containment is part of the preferred alternative for WAG 8.

I am concerned that DOE-ID appears to be using the engineered barrier or rock cover that was emplaced at the SL1 burial grounds and at the BORAX facility as the prototype barrier for any subsequent proposed disposal facilities on the INEEL. This SL1-style rock cover or "barrier" is part of the containment alternative presented in the proposed plans for both WAG 8 and WAG 9. It is well documented that the effect of this rock cover would be to increase infiltration and minimize evaporation thereby increasing the amount of water available to leach contaminants from the disposed soil the cover is supposed to protect. I have read the proposed plan for WAG 8 and pertinent portions of the WAG 8 Comprehensive RI/FS and see no acknowledgment that this rock cover will increase infiltration. The fact that this rock cover will increase infiltration and leaching should be plainly stated in the proposed plan for the information of members of the public. If anything, the wrong impression is given in the Overall Protection of Human Health and Environment section of the proposed plan for WAG 8 (page 16) where it is stated that Alternative 3 will "minimize infiltration." This last statement is miserably incorrect and needs to be changed.

While the groundwater pathway may not have been a risk in the baseline risk assessment for either WAGs 8 or 9, even with infiltration rates as high as 1 m/yr, it still seems wrong from an environmental stewardship viewpoint to needlessly install a rock cover that will undoubtedly increase leaching from the contaminated soil and increase concentrations of leached contaminants in the Snake River Plain aquifer. I feel this statement is true even if the increased infiltration caused by the rock cover only incrementally increases contaminant concentration in the aquifer because there are better cover alternatives. True engineered barriers that provide the necessary shielding and biotic protection have been designed and are being tested on the INEEL. These barriers are resistant to erosion and minimize infiltration. These barrier designs should be given a thorough comparative evaluation to an SL1-style barrier for use in the preferred alternative. This comparison should include analysis of even incremental risk increases in the groundwater pathway from increased infiltration due to the rock cover. Hopefully, this comparison will occur since there are words in the Comprehensive RI/FS for WAG 8 that the proposed rock cover in Alternative 3b is a "conceptual design" and that the final design will be developed during the remedial design process.

The WAG 8 Comprehensive RI/FS cites Reith and Caldwell (1990) as stating the proposed barrier is appropriate for containment in an arid area. I have read the article by Reith and Caldwell and, although the article admits that several of these rock covers have been built at UMTRA sites, the main point presented in the article is that since vegetated soil covers are more effective for reducing infiltration and subsequent leaching from contaminated soil, vegetative covers should be used in semiarid climates to protect the environment from contaminated soils rather than simple rock covers. This gives the appearance that the Reith and Caldwell article is incorrectly cited out of context for purposes of justifying the choice of engineered barriers.

Response: As stated in the WAG 8 Proposed Plan and the NRF Comprehensive RI/FS, the cover shown in the Proposed Plan and RI/FS is only one possible design. All comments received on the cover design will be considered during the remedial action design phase. One of the purposes of Alternative 3 will be to minimize infiltration to prevent contaminant migration. Presently, the leaching beds are a depressed pond area with large cobblestone along the bottom, making an ideal infiltration situation, yet sampling has shown very little migration to date of contaminants of concern. The consolidation of soil in the pond area and the construction of any type of cover would actually decrease infiltration compared to what currently exists. The

cover layers may include a low permeability layer or layers of soil with sufficient thickness to enhance evapotranspiration. A top layer for a vegetation cover will certainly be considered. The experience gained at NRF during the construction of three landfill caps with vegetation covers was also valuable. NRF was successful at designing covers which resist erosion and minimize surface infiltration. This experience will be put to use during the design of the covers proposed by Alternative 3.

The purpose for citing the Reith and Caldwell reference was to show that a rock-type cover is a potential cover in an arid climate, but possibly not an appropriate cover in a humid climate. It was not intended to justify any cover design.

Comment 24

If the preferred alternative is actually selected and implemented through a ROD, I would hope that shallow monitoring within the vadose zone beneath the consolidated soil disposal would occur to verify the assumptions and results that were used in the subsurface pathway flow and transport modeling that was performed to demonstrate the acceptability of the chosen remedy.

Response: Vadose zone monitoring will be considered during the remedial design phase as well as various other monitoring methodologies (i.e., radiation surveys, soil sampling, and groundwater monitoring).

Comment 25

Analyses seem conservative and thorough. I favor Alternative #3. If more excavation than that is considered, extreme care/caution would be needed to insure that close to zero plutonium compounds are airborne and subject to human ingestion. No amount of plutonium ingestion is considered safe. Various isotopes are probably present in minute quantities.

Response: The highest amounts of plutonium detected were in the leaching bed areas that are not planned for excavation. Even the maximum amount of plutonium detected in the soil at NRF, including in the leaching beds, showed risks to a 100-year future resident at 6E-06 for soil ingestion and 2E-06 for food crop ingestion (the only significant pathways for plutonium). Current risks to occupational workers showed a maximum risk of 2E-06 through the soil ingestion pathway. Each of these risk values are within the NCP target risk range.

Comment 26

Why do we (you) keep moving and shuffling this radioactive so called hazardous waste around to contaminate more and more area? We might as well just eat the stuff and be done with it or sell it to the fertilizer and petroleum industry and let them spread it around. It would be less money than INEEL spent fooling around. Or are you waiting for your retirement plan to kick in then you can move far away from ground zero. No more of your worry!

I think maybe you people are missing something which is filtering into water aquifers and killing and sterilizing fishes and other living, now dead things. Why keep stirring the pot to make dust and fumes fly around to contaminate more! Is this just a job, or do you really care?

Either INEEL or U.S. Postal Service - Thank You - Your mailings didn't get to North Idaho until the day of the Public Meetings or after not much time to schedule. After the fact. Guess our highways are slow traffic only. Thank You. The goat trail to North Idaho.

Response: The contaminated soil to be excavated will not be RCRA hazardous waste (see response to Comment #7). The option chosen will decrease the total area of contamination.

Controls would be used during soil consolidation to minimize the spread of dust. The sampling of groundwater monitoring wells around the perimeter of NRF currently measures the quality of groundwater and helps ensure past operations have not adversely impacted the aquifer.

We apologize for the late notification and, as a result, the comment period was extended for 30 days.

Comment 27

The scope of the proposed cleanup at the Naval Reactors Facility and the discussion at the Idaho Falls public meeting point once again to a fundamental dilemma facing Department of Energy cleanup. That dilemma is ongoing uncertainty, confusion, and disagreement about the magnitude of the DOE's long-term stewardship responsibilities. On the one hand, nuclear material should not be dinked with more than necessary, and handling, treating, and transporting it should occur only when environmental and health protection demands any of those steps. On the other hand, any residual material presents a risk. The level of residual risk will obviously affect the level of stewardship required. Then there is the question of the future uses for any site--from nature preserve to industrial park to residential neighborhood--which will also affect stewardship requirements. Commentors in Idaho Falls raised both these questions.

There is a land use plan for INEEL, and it is our understanding that it is being used by the DOE and its regulators to guide cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act. But that plan was developed through a less than perfect process with very little public involvement.

Acceptable risk and future use are both topics that deserve and are amendable to wide, ongoing public discussion, and it is clear that discussion has not yet really begun. This is particularly unfortunate since, as the decades pass, it's quite likely that stewardship will become more and more the responsibility of local communities. Some decisions about long-term stewardship cannot be made for many years, and some we're working from now will no doubt be revisited. The Alliance encourages efforts to engage the public in broad, ongoing consideration of the long-term stewardship required at INEEL.

Specific to the cleanup of NRF, it is quite frankly a relief that, unlike its spent fuel, the nuclear navy does not propose to treat and transport to a fare-thee-well the soil it has contaminated at INEEL. On the other hand, the environmental benefits of consolidating contamination are not entirely clear. The nuclear footprint in Idaho will never fit in the glass slipper.

Response: If contaminants are left on site above risk-based concentrations, CERCLA requires a review of the selected remedy every five years to evaluate the effectiveness of assumptions, remedies chosen, and decisions made during the CERCLA process. One assumption agreed with by the DOE, EPA, and IDHW was that a Government or institutional presence will be in place for 100 years. Although predicting the future land use scenarios has many uncertainties, the five year CERCLA review process helps accommodate these uncertainties, particularly in later years. Part of the consideration for the selected alternative was to include institutional controls that would prevent access to the sites of concern even if there is no longer a Government presence at NRF. These institutional controls include fencing or other barriers, permanent markers, and legal land use restrictions. Regarding land use, standard INEEL scenarios were used: on-site workers for near term exposure and residents for 100 years in the future. Actual future land use decisions were beyond the scope of this study.

The primary benefit to consolidating the soil in a few locations rather than covering each area is that it is not practical to individually cover or cap several of the sites of concern. Most of the sites to be excavated are under concrete basins, below asphalt roadways, or between security

fences. Therefore, the only feasible alternatives available for these sites were no action, additional monitoring, or excavation. Consolidating soil and placing an engineered cover over the consolidation area will prevent animal/erosion intrusion while also being designed to limit maintenance requirements, and reduces overall risk.

Comment 28

The 1995 nuclear waste deal included a commitment from the nuclear navy to spend $45 million on "discretionary" environmental remediation within five years. Activities carried forward under CERCLA are required by law and are not at the polluter's discretion. Without question, the funds promised in the nuclear waste deal cannot be used for any part of the proposed cleanup plan under review here. The $45 million raises other questions, though. What, if any, role will DOE-Idaho, the Environmental Protection Agency, and the State of Idaho have in determining expenditure of the promised $45 million? What criteria (e.g., downstream health protection) will be used? More to the point, *as required* environmental activities at INEEL grow increasingly problematic both through budget constraints and through the DOE's inability to meet technical and management challenges, is it appropriate to spend $45 million on *discretionary* remediation at all?

Response: The Navy does not intend to spend any of the committed $45 million in discretionary remediation funding to accomplish CERCLA-required actions discussed in this ROD. The $45 million in the "Idaho Agreement" documents the Navy's ongoing commitment to pro-actively remediate site facilities to minimize future environmental liabilities. Other decontamination and dispositioning tasks will be accomplished with this funding, with the objective of obtaining the greatest benefit in the most cost-effective manner. To a large extent, the Naval Nuclear Propulsion Program uses its discretionary authority to focus funding on remediation projects addressing the more significant near term risks. See also the discussion of costs and planned decontamination and dispositioning actions in the response to Comment 39 below.

Comment 29

How did you folks get silver in the parking lot runoff trenches? What are your tire studs made of?

Response: Silver was only detected above background levels in one sample at 1.25 parts per million (ppm). The risk-based concentration for silver as calculated in the NRF Comprehensive RI/FS is 39 ppm. Because there was such a low concentration of silver detected in only one sample, it is questionable that a source exists. If a source is present, the small fluid leaks and wear products from automobiles in the parking lot are the most likely source. Alternatively, a small spill of automotive battery acid contacting an old silver dime could account for such trace levels.

Comment 30

I have read Snake River Alliance's comment letter dated February 10, 1998, from Beatrice Brailsford and concur with the contents. I lived in Idaho from 1977 to 1991 and I have always been concerned about INEEL, nuclear pollution and contamination, the aquifer and the Snake River.

Response: Please see responses to Comments 27, 28, and 29.

Comment 31

Alternative 3 is not less costly than Alternative 4, Complete Excavation and Off-site Disposal. The Alternative 4 cost analysis was exaggerated by more than 400% of what is commercially available at a low-level radioactive facility off-site from INEEL through contracts to which the DOE and INEEL currently have access. As a result, Alternative 4 has less construction/capital costs associated with it, and as indicated in the cost analysis, operation and maintenance costs for this option are minimal, since all material would be moved to an off-site commercial disposal facility.

Response: Alternative 4 is significantly more expensive than Alternative 3. The costs shown in the NRF Comprehensive Feasibility Study show a landfill disposal cost for each site that is excavated. This cost is estimated to be near $400 per cubic yard. This not only represents the disposal fee, but also the significant additional costs associated with handling, packaging, and transporting radioactively contaminated soil. Once packaged and ready for shipment the actual disposal fees may only be $100 per cubic yard. This difference takes into account the additional requirements needed during handling, packaging, and transporting activities for radioactive soil.

For Alternative 3, once the soil is placed in the leaching beds and a base layer of clean soil is placed over the area, cover construction would not require stringent radiological controls. Alternative 4 would require much more construction activity, to excavate over seven times the amount of contaminated soil to a depth of over 30 feet (vice 14 feet).

Comment 32

It is arguable that complete excavation and disposal (Alternative 4) requires more construction activity than limited excavation and disposal (Alternative 3). Although less material may be moved, the construction of a cap and cover system requires significant construction activity and is potentially equivalent to the limited excavation option.

Response: See response to Comment 31 above.

Comment 33

Alternative 3 is not more implementable than Alternative 4. It is stated that Alternative 4 ranks lowest in implementability because of additional excavation, transportation concerns and the uncertainty of the availability of off-site disposal facilities. First, commercial implementation of projects of this scope are quite routine and have been proven successful. Commercial contractors have trained workforces, thus eliminating the training that Alternative 3 requires, Second, INEEL have successfully transported large quantities of waste from INEEL to Envirocare of Utah without mishap, thus reducing any transportation concerns. Third, off-site disposal capacity is prevalent. Envirocare of Utah maintains a future capacity for low-level waste in excess of 12 million cubic yards and is accessible through current government contracts.

Response: The first option for Alternative 4 is an on-INEEL soil repository that is being proposed by the Idaho Nuclear Technology and Engineering Center (INTEC) (formerly the Idaho Chemical Processing Plant (ICPP)), which would likely be the least expensive of the off-site (away from NRF) options. Uncertainty exists, since the repository has not been established, which makes the implementability of Alternative 4 using an INEEL soil repository questionable. Although projects of Alternative 4's scope have been performed in the past, there are aspects of Alternative 4 that make it more difficult to implement than Alternative 3. Alternative 4 would require excavating to a depth of 30 feet compared to an estimated maximum depth of 14 feet for Alternative 3. As previously stated, any work involving radiological controls

is less efficient and more difficult to implement. Regardless of the successful transportation of past INEEL shipments to Envirocare, the additional concerns, regulations, and public sentiment make transportation of radioactive material along public highways or railways a concern that is included in the assessment of alternatives. Hence, the agencies believe that Alternative 3 is easier to implement than Alternative 4.

Comment 34

Alternative 3 required unlimited future surveillance and maintenance, creating an unending mortgage cost for the government and citizens. Not only is the cost estimate for these costs probably underestimated, but Alternative 4 eliminates these future costs.

Response: The agencies agree that Alternative 3 will require future monitoring and possibly maintenance; however, the 30 year costs show that Alternative 3 is less expensive than Alternative 4. The cover design will limit most maintenance needs. Institutional controls will be established to limit access and the need for continuous surveillance. Periodic reviews will evaluate future monitoring and maintenance requirements. Although future operations and maintenance (O&M) costs beyond 30 years can be assumed they are expected to be minimal based on proper cover design and established institutional controls. The future surveillance and maintenance costs would be similar for the Federal Government or an NRC regulated commercial disposal facility; the difference being Alternative 4 applies the cost upfront in the form of disposal fees. A commercial disposal facility also introduces potential future liabilities, if the company ceases to exist or fails to comply with all regulatory requirements.

Comment 35

Overall protection of human health and the environment is not equally served by alternatives 3 and 4. Placement of radioactive waste in an off-site facility licensed and selected for its suitability for radioactive material and maintained by a specialized staff trained specifically for this service is more protective than on-site capping.

Response: The overall protection of human health and the environment includes the evaluation of several criteria, particularly long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. Both alternatives comply with ARARs. Alternative 4 was judged better for long-term effectiveness and permanence based on the complete removal of the contaminant source and the reasons cited in the comment. However, Alternative 3 was judged to have a better short-term effectiveness because less contaminated soil is excavated and handled. Both alternatives satisfy the criteria of overall protection of human health and the environment, and were therefore given an equal rating. For Alternative 3, an appropriately trained staff will be employed at NRF for the remedial actions taken.

Comment 36

The presenters provided comprehensive discussions on the numerous sites assessed at the NRF during the Comprehensive Remedial Investigations. These investigations evaluated the potential for risk to human health from chemical and radiological sources at the NRF as well as looking into related ecological and hydrogeological issues.

The Coalition 21 has no criticisms or comments on the proposed Plan but reserves the right to comment at a further date should that be considered necessary by the Coalition's Board of Directors.

Response: The agencies appreciate the time and effort made to read and comment on the Proposed Plan.

Comment 37

I am interested in learning, can a "waterproof material" or "liquid rubber" be sprayed over the 4" gravel and under the contaminated soils to prevent water from permeating through the engineered covers? This water resistant material could be sprayed from a large vehicle or crane over the site and would "dry or shrink" after being exposed to the environment.

Response: Technologies that required a barrier to be placed beneath the contaminated soils were evaluated in the NRF Comprehensive Feasibility Study and were determined to be too difficult to implement, too costly, and therefore not practical. The inclusion of a rubber type material, or impermeable layer, above the contaminated soil will be considered during the cover design phase of the project.

Comment 38

Can a "sponge like material" or "absorbent" be added to the contaminated soils and liquids that might help prevent migration of the contaminated water to a lower aquifer?

Response: There is no contaminated liquid present at the sites of concern. Infiltration of water from precipitation events will be minimized by the installation of the cover. See the response to Comment 4 that discusses the limited migration potential at the sites of concern.

Comment 39

The INEEL CAB recommends selection of Alternative 3 as the preferred alternative for cleanup at NRF. It is less costly than the other alternative which also achieve appropriate risk reduction objectives. It also reduces risks to a more acceptable level than the less costly alternatives. By consolidating materials at an existing site at the NRF, the preferred alternative also minimizes transportation, risks to site workers, and potential for airborne contamination.

Alternative 3 would involve limited excavation of an estimated 58,080 cubic feet of contaminated soil and placement of the soil in the S1W leaching beds; containment of on-site disposal areas with earthen covers; removal to an approved low level radioactive disposal area of contaminated underground piping and concrete structures; and implementation of monitoring, fencing, other barriers, and/or land use restrictions.

While the INEEL CAB supports the risk reduction measures that would be achieved through implementation of Alternative 3, we are concerned about the much higher costs compared to Alternative 2 and about the accuracy of cost estimates as presented. The Board recommends that the Record of Decision (ROD) provide documentation that no other, less-costly alternatives exist which could achieve the desired risk reduction objectives. In addition, the ROD should provide documentation of total lifecycle cost estimates for all alternatives to allow comparisons among them and to document the justification for selecting an alternative which will require long-term institutional controls and monitoring.

Alternative 2 would involve various institutional controls and additional monitoring. Long-term monitoring of the soils and groundwater would continue through the control period. Fencing or other barriers would be constructed around the sites of concern to inhibit access to the area. Land use restrictions would be obtained near the end of the control period to prevent excavation in areas where wastes are contained and would include the placement of permanent property markers with posted signs.

Response: Section 6.7 of the ROD includes a more detailed cost breakdown than was presented in the Proposed Plan. This includes the specific costs associated with each action associated with Alternatives 2, 3, and 4. Although Alternative 3 is more expensive than the limited action associated with Alternative 2, the agencies feel the costs are justified. One consideration which is not evident from the cost estimate or the comparison of alternatives is that all sites being excavated as part of Alternative 3 were previously identified as areas of planned decontamination and dispositioning removals. The piping and concrete structures at these sites were not originally part of the CERCLA investigations; only contaminated soils outside contained systems were the focus of CERCLA investigations. Therefore, some of the excavation costs associated with these areas were expenses that were part of NRF's planned future decontamination and dispositioning activities.

The only feasible alternative (as determined in the NRF Comprehensive Feasibility Study) other than Alternative 3 that could achieve the desired overall protection of human health and the environment was Alternative 4. Other technologies were screened out during the development of alternatives. The least costly option available in Alternative 4 is likely the disposal of excavated soil to a soil repository established at the Idaho Nuclear Technology and Engineering Center (INTEC) (formerly the Idaho Chemical Processing Plant (ICPP)). However, the costs associated with placing covers over the consolidated areas, which are part of Alternative 3, are small compared to the costs of excavating over seven times more radiologically contaminated soil, which is necessary as part of Alternative 4. The actual disposal fees are small compared to the costs associated with excavating the contaminated soil and preparing the soil for shipment to a disposal facility away from NRF. For additional cost information see the response to Comment 31.

Comment 40

The INEEL CAB members understand that the assumptions used in the risk assessment process are conservative. The Proposed Plan does not describe the assumptions with enough detail to allow members of the general public to understand. The ROD should provide a better explanation of the risk assessment process and make it understandable to the general public (e.g., use quantities people can relate to).

The INEEL CAB also understands that the primary risk imposed by contamination at NRF is direct exposure. That fact is not well communicated in the Proposed Plan. It should be better communicated in the ROD so as to limit concerns among people living at a distance from the facility.

Response: Section 4.1.2.2.2 of the ROD specifically discusses the assumptions made in the risk assessment. Section 5.1 of the ROD also more clearly defines that direct exposure to cesium-137 is the primary risk associated with the sites of concern.

Comment 41

I'm concerned about the proposed engineering design. My name is Buck Sisson. I live in Idaho Falls. I'm concerned about the proposed engineered barrier over the top. It has a tendency - - it will maximize infiltration, probably collect snow and a lot of infiltration that is going on, really accelerating migration that should take place. I think that would be - - I'm worried about the engineered burial that is going to maximize infiltration and it will trap snow, and there won't be any plants growing, so it will maximize the infiltration and the leaching of the soluble waste.

There are much better alternatives than that. DOE spent quite a bit of money on developing cap or barrier designs that minimize that leaching effect, and it should be seriously considered.

Also the monitoring system should be in place in the vadose zone so you get an early warning if anything goes haywire. You'd have plenty of time to make remedies and fix it.

Response: See responses to Comments #2 through #5. Vadose monitoring as well as other monitoring methodologies will be considered during the cover design phase.

Comment 42

My name is Joe Merted. I would like to see a sharing of the technologies and the study data and the other ways that they have used to make decisions, and I'd like to see the modeling made available so that we can understand weather and understand groundwater phenomena and also deep water phenomena at the site and also in our areas. I've noticed in the previous studies that they've used models for weather forecasting that weren't based on our particular area. I would like to see a dynamic model of the Snake River Valley developed. I think it would help not only the site but agriculture and all this. These are probably some of the spinoffs that could happen from this wonderful science that we're seeing, and I would like to see more of that happen.

Response: The development of weather models was beyond the scope of the NRF Comprehensive RI/FS. No weather models were used; however, weather patterns, including average precipitation, temperature, and wind conditions, were assumed to remain the same during the scenarios evaluated. As identified in Appendix H of the RI/FS, the models used for evaluating groundwater at NRF included GWSCREEN, MODFLOW, and MEMO. GWSCREEN is a groundwater contaminant fate and transport model available to all Federal Governmental institutions and contractors. MODFLOW is a groundwater flow model that is a public domain program available to the public; a copy will be provided upon request. MEMO is a groundwater fate and transport dispersive flow model used to optimize placement of groundwater wells, and is available to Federal Governmental institutions and contractors.

Intentionally Blank Page